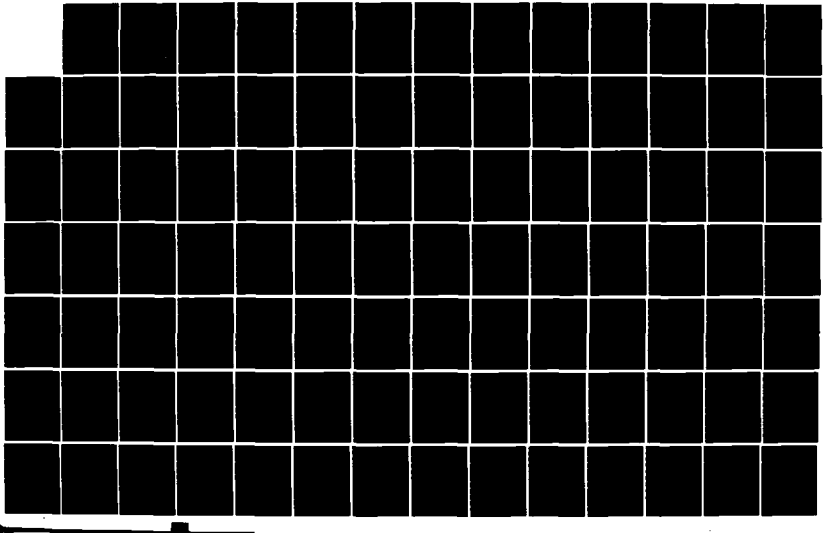
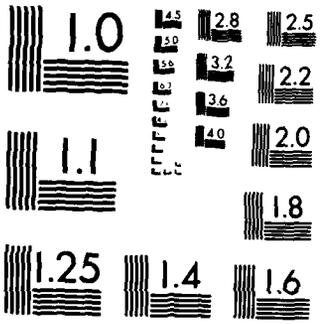
AD-A152 540 MM2 LRSLA TESTING STAGE III PROPELLANT(U) OGDEN AIR LOGISTICS CENTER HILL AFB UT PROPELLANT LAB SECTION E M DALABA JAN 85 MANPA-501(85) 1/2

UNCLASSIFIED F/G 21/8.2 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

HEADQUARTERS
OGDEN AIR LOGISTICS CENTER
UNITED STATES AIR FORCE
HILL AIR FORCE BASE, UTAH 84056

AD-A152 540

MM2 LRSLA TESTING

STAGE III PROPELLANT

PROPELLANT LAB SECTION

MANPA REPORT
NR 501(85)

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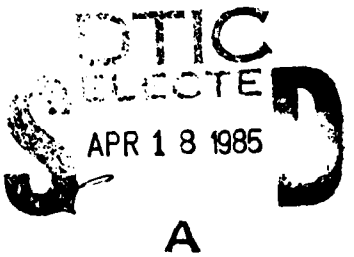

January 1985

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MANPA REPORT NR 501(85)

MM2 LRSLA TESTING

STAGE II PROPELLANT

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January 1985

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Ogden Air Logistics Center
United States Air Force
Hill Air Force Base, Utah 84056

ABSTRACT

Data in this report is a continuation of LRSLA testing on Stage III Dissected Motors. Problems in testing C-7 bonds were not alleviated by changing specimen size as previously suggested.

The data variation that has been observed has prompted a closer analysis of testing for variance.

The plotted points used on the regression plots are a combined average of test results at a designated test period.

The data variance within test periods is now demonstrated with the addition of separating the test results into individual plotted points on the regressions for each test period.

Data variance between motors is demonstrated by the use of unique motor plot symbols in the multi-motor regressions. These unique symbols are data mean values and the number of samples per mean can be found with its minimum and maximum values in the sample size summary.

Statistically, these multi-motor regressions are inappropriate for analysis use and should be used for visual display only to show motor-to-motor relationship.

QUALITY INSPECTED

By
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LIST OF FIGURES (cont)

SECTION I

INTRODUCTION

In 1968, OO-ALC began testing dissected motors. Changes to the Aging and Surveillance program reduced the number of test motors to five per year. In 1983, one additional motor was added to the program.

In 1976, humidity conditioning at 50 $\pm$ 5 percent relative humidity for 48 hours was introduced into the program. Longer conditioning times, depending upon the thickness of the test specimen, began in 1981. At that same time changes were also made in several test parameters (GTD-30, Rev 2, 1 April 1981).

The motor serial numbers, lot numbers, cast dates and symbols used in the computer plots are shown below.

Motor S/N	Lot Number	Cast Date	Symbol
0031064	SR-56-62	62294	□
0031134	SR-65-62	63328	○
0032434	RAD-1-1-63	64021	△
0032619	RAD-1-4-64	64258	✱
0032831	RAD-1-1-65	65176	+
0033174	RAD-1-10-66	67020	×

STATISTICAL APPROACH

Regression analysis has been selected as the method for projecting aging trends and demonstrating data variation in the propellant. The linear model $Y = a + bX$ was found to have the best fit throughout the data for this report.

A unique plot symbol is used for each motor tested. Analysis of covariance results indicate that the combined motor regression plots are to be used for visual display only.

Most points on the regression plots represent a data mean value at its particular age at test. The remaining points are single valued as shown in figures 4-11 thru 4-15, 4-21 thru 4-25, 4-31 thru 4-35, 4-41 thru 4-45, and 4-51 thru 4-55. The single valued points have multi-points per its particular age at test. Sample sizes per the mean values can be found in the Sample Size Summary. All regressions are calculated on single data values.

The data variance about each regression line was used to compute a tolerance interval such that at 90% confidence 90% of the sample distribution will fall within this interval. This tolerance interval is extrapolated 24 months beyond the age of the last test date.

The F value and student 't' values with their significance are recorded at the top of each regression. The significance gives an indication of the regression statistical significance of the trend line slope as compared to a line of zero slope.

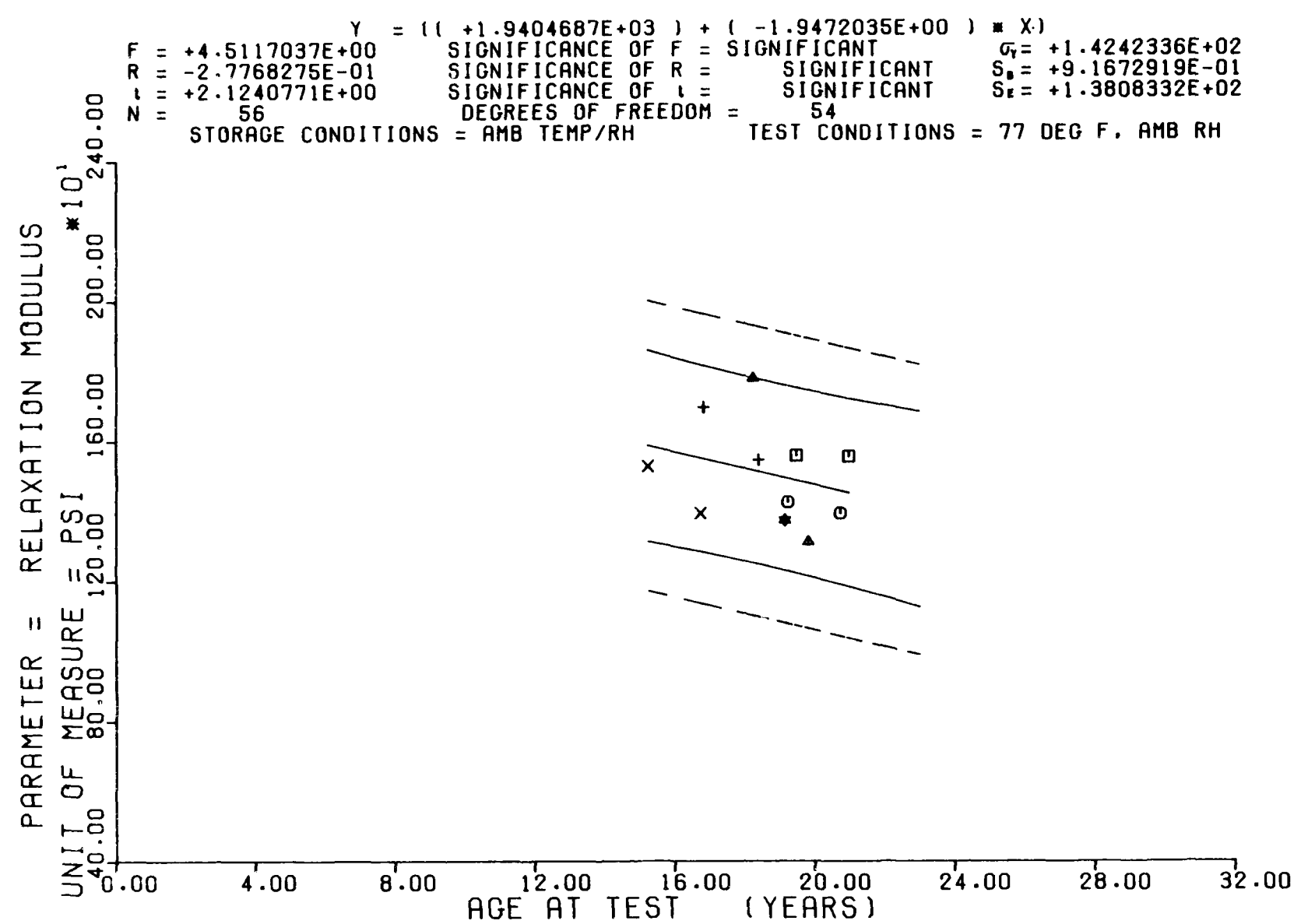
SECTION II

STRESS RELAXATION

Stress relaxation specimens (0.5" x 0.5" x 4") were tested in the OO-ALC program at 3% strain and 77°F. In 1978, under the LRSLA program, an evaluation program tested two types of specimens at 2% strain, at 77°F. At the same time, specimens were tested at -30°F under 300 psi. The severe conditions could not be reproduced and testing was dropped.

Visual display for six motors and two test periods is shown in figures 2-1 thru 2-4. These combined data show a significant decrease in strain at rupture. The trend is not obvious for the two oldest motors for stress at rupture, but shows clearly for the RAD motors.

Individual regressions should be available for inclusion in the next report.



STRESS RELAXATION MODULUS AT 10 SEC AND 2% STRAIN, SIX MOTOR VISUAL DISPLAY

Figure 7-

*** LINEAR REGRESSION ANALYSIS ***

*** ANALYSIS OF TIME SERIES ***

AGE (DECADES)	SPECIFIED PCT OF GOOD	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
70.0	1	+7.9599990E+01	+0.0000000E+07	+7.9599990E+01	+7.9599990E+01	+8.1823532E+01
80.0	1	+8.4399993E+01	+0.0000000E+07	+8.4399993E+01	+8.4399993E+01	+8.1574157E+01
85.0	5	+8.2000000E+01	+7.0710678E-01	+8.3000000E+01	+8.1000000E+01	+8.1280422E+01
100.0	10	+8.2799987E+01	+1.0427955E+00	+8.4000000E+01	+8.1000000E+01	+8.1094589E+01
110.0	5	+8.3000000E+01	+1.0000000E+00	+8.4000003E+01	+8.2000000E+01	+8.0883575E+01
120.0	5	+7.8399993E+01	+1.1401754E+00	+8.0000000E+01	+7.7000000E+01	+8.0615020E+01
140.0	5	+7.6199996E+01	+1.3033404E+00	+7.7000000E+01	+7.4000000E+01	+8.0365640E+01
150.0	5	+7.8199996E+01	+8.3666002E-01	+7.9000000E+01	+7.7000000E+01	+8.0192993E+01
200.0	6	+7.8666656E+01	+5.1639777E-01	+7.9000000E+01	+7.8000000E+01	+7.8696746E+01
400.0	5	+8.0399993E+01	+8.9442719E-01	+8.2000000E+01	+8.0000000E+01	+7.8351458E+01

REGRESSION II, STAGE III, DISSECTED NTR <00311134>

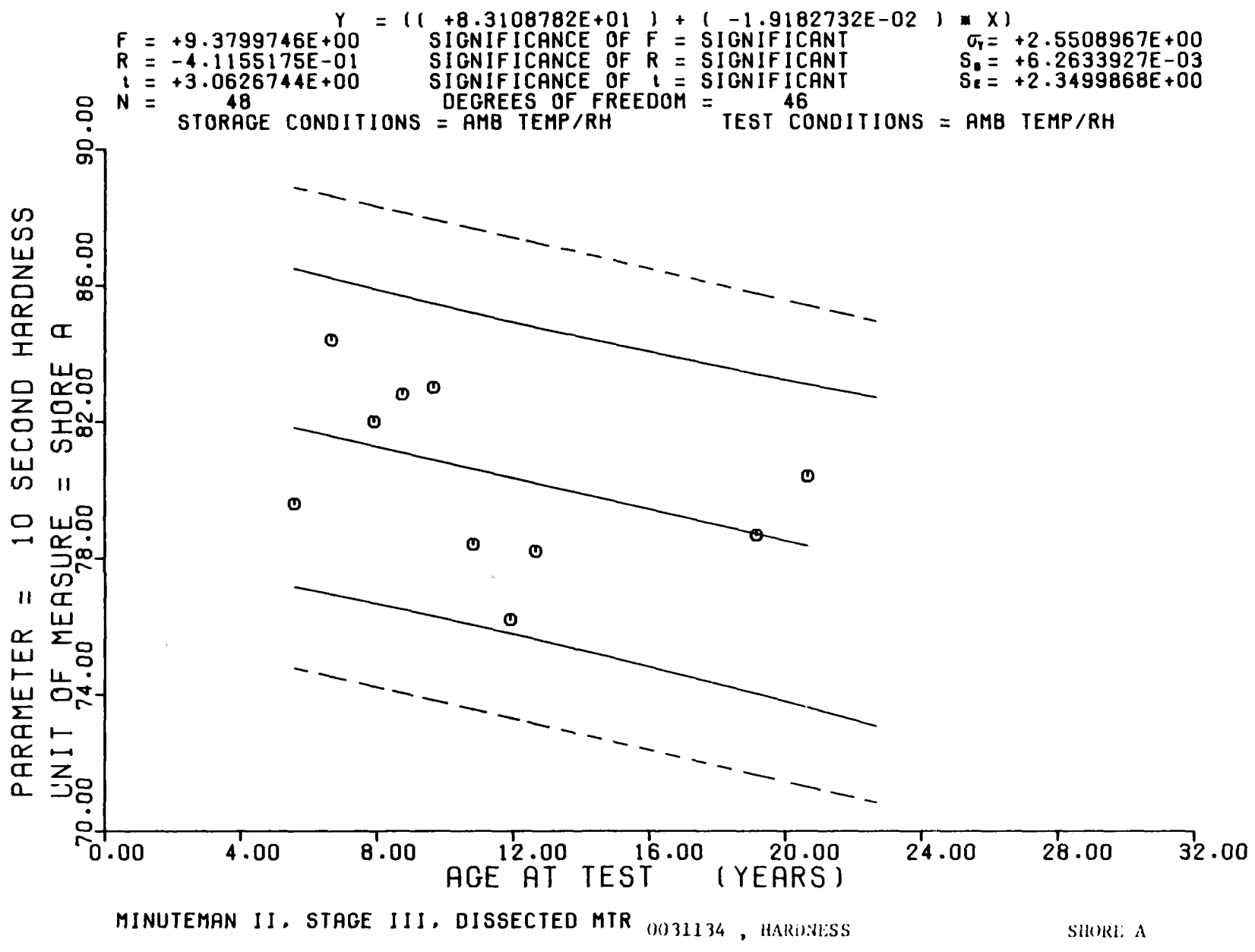

Y = ((+8.3108782E+01) + (-1.9182732E-02) * X)
F = +9.3799746E+00 SIGNIFICANCE OF F = SIGNIFICANT σY = +2.5508967E+00
R = -4.1155175E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +6.2633927E-03
t = +3.0626744E+00 SIGNIFICANCE OF t = SIGNIFICANT Se = +2.3499868E+00
N = 48 DEGREES OF FREEDOM = 46
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = 10 SECOND HARDNESS
UNIT OF MEASURE = SHORE A
90.00
86.00
82.00
78.00
74.00
70.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
MINUTEMAN II, STAGE III, DISSECTED MTR 0031134 , HARDNESS SHORE A

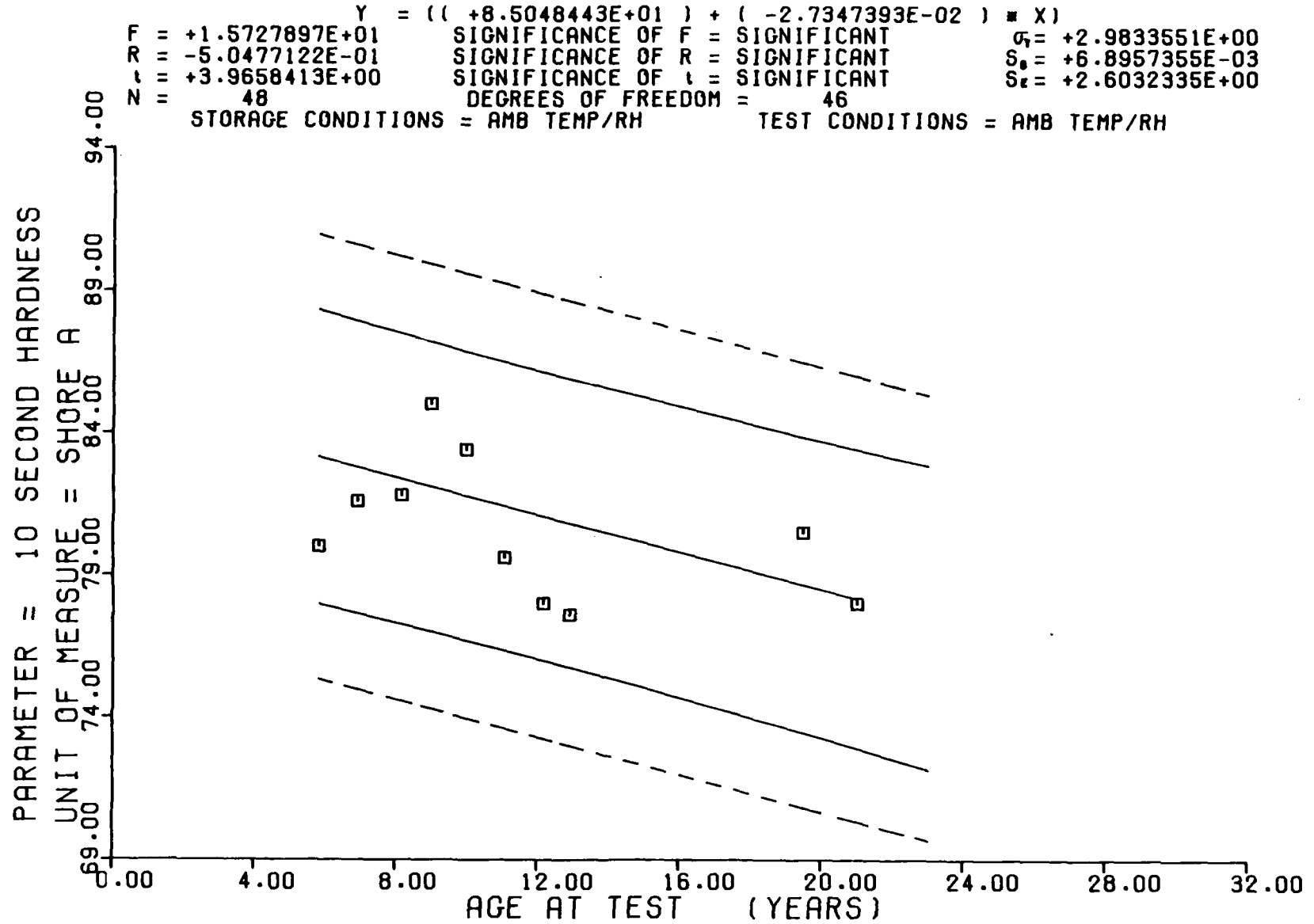
Figure 3-3

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

X R (DEGREES)	SPECIFIED PER SECT	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
75.0	1	+8.0333300E+01	+0.0000000E+07	+8.0333300E+01	+8.0333300E+01	+8.3134124E+01
90.0	1	+8.1599990E+01	+0.0000000E+07	+8.1599990E+01	+8.1599990E+01	+8.2778594E+01
105.0	5	+8.1799987E+01	+1.3954451E+00	+8.3000000E+01	+8.0000000E+01	+8.2368392E+01
120.0	10	+8.5000000E+01	+1.0540925E+00	+8.7000000E+01	+8.4000000E+01	+8.2094924E+01
135.0	5	+8.3599992E+01	+8.9442719E-01	+8.4000000E+01	+8.2000000E+01	+8.1766754E+01
150.0	5	+7.9599990E+01	+1.1401754E+00	+8.1000000E+01	+7.8000000E+01	+8.1411239E+01
165.0	5	+7.8000000E+01	+1.0000000E+00	+7.9000000E+01	+7.7000000E+01	+8.1055709E+01
180.0	5	+7.7599990E+01	+1.3416407E+00	+7.9000000E+01	+7.6000000E+01	+8.0809585E+01
194.0	6	+8.0500000E+01	+1.3784048E+00	+8.2000000E+01	+7.9000000E+01	+7.8649139E+01
252.0	5	+7.9000000E+01	+2.3452078E+00	+8.1000000E+01	+7.6000000E+01	+7.8156890E+01

MINUTEMAN II, STAGE III, DISSECTED MTR <00310064>



MINUTEMAN II, STAGE III, DISSECTED MTR 0031064 , 10 sec HARDNESS , SHORE A

Figure 3-2

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NO. SAMPLES	AGE (MONTHS)	NO. SAMPLES
50.0	1	130.0	5
51.0	1	133.0	5
55.0	1	140.0	5
56.0	10	152.0	5
60.0	5	155.0	5
67.0	1	183.0	5
68.0	1	201.0	5
69.0	5	202.0	5
70.0	1	219.0	5
72.0	10	230.0	5
80.0	1	234.0	5
82.0	5	237.0	5
83.0	1	248.0	5
84.0	5	252.0	5
87.0	5		
92.0	5		
95.0	5		
98.0	5		
104.0	5		
105.0	20		
108.0	10		
110.0	5		
111.0	5		
120.0	5		
121.0	5		

FEMININE II, STAGE III, DISSECTED 0.0031734,0.0032434,0.0032831,0.0033174

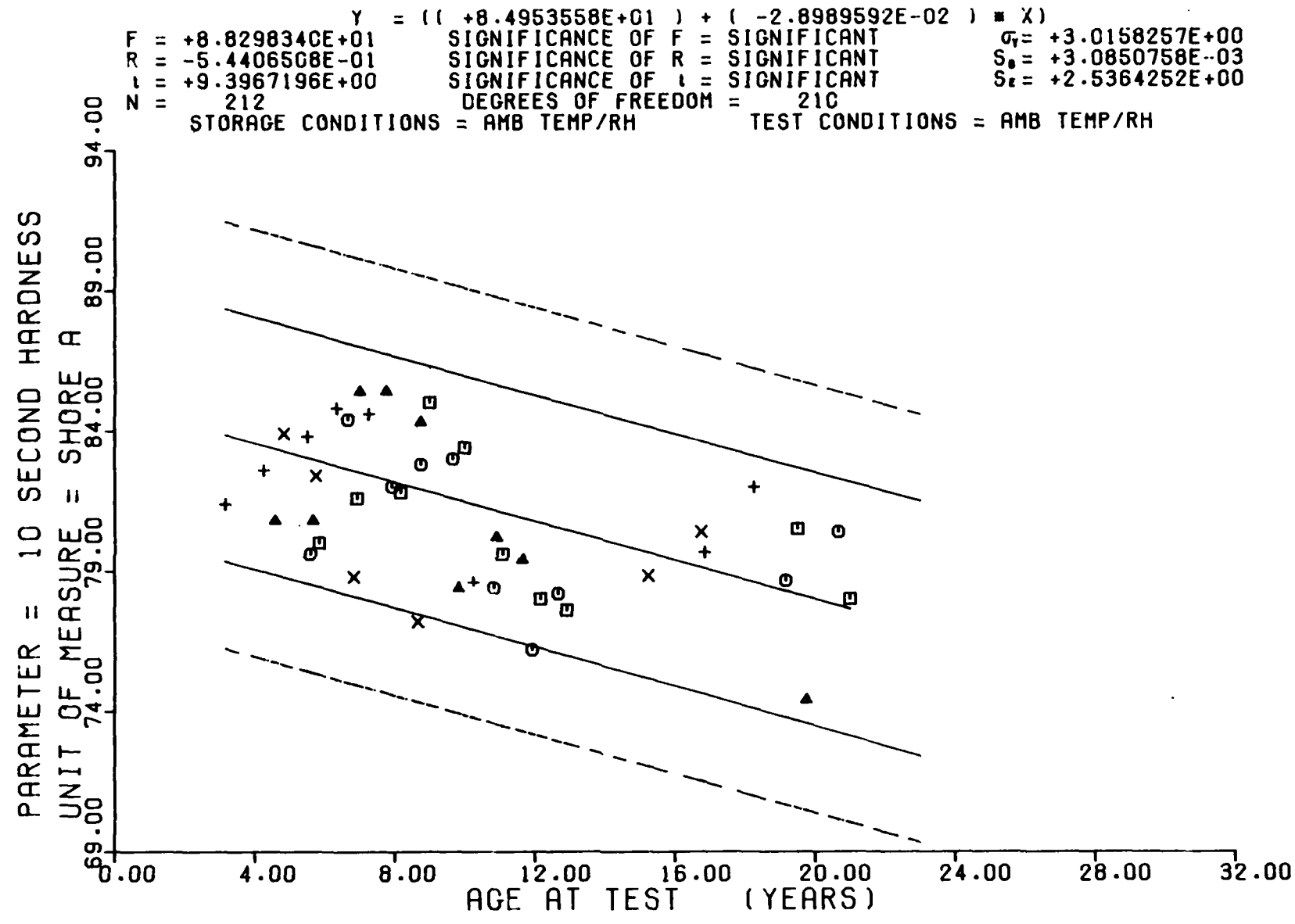

Y = ((+8.4953558E+01) + (-2.8989592E-02) ■ X)
F = +8.829834CE+01 SIGNIFICANCE OF F = SIGNIFICANT σY = +3.0158257E+00
R = -5.4406508E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +3.0850758E-03
t = +9.3967196E+00 SIGNIFICANCE OF t = SIGNIFICANT Se = +2.5364252E+00
N = 212 DEGREES OF FREEDOM = 210
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = 10 SECOND HARDNESS
UNIT OF MEASURE = SHORE A
94.00
89.00
84.00
79.00
74.00
69.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
MINUTEMAN II, STAGE III, DISSECTED MTRS/0031064,0031134,0032434,0032831,0033174

Figure 3-1

SECTION III

HARDNESS

The Shore A and Shore C hardness testing were performed on dogbone ends.

Figure 3-1 is a visual display of the 5 motor data. Figures 3-2 thru 3-6 show Shore A hardness on individual motors. All regressions show a significant decrease in hardness.

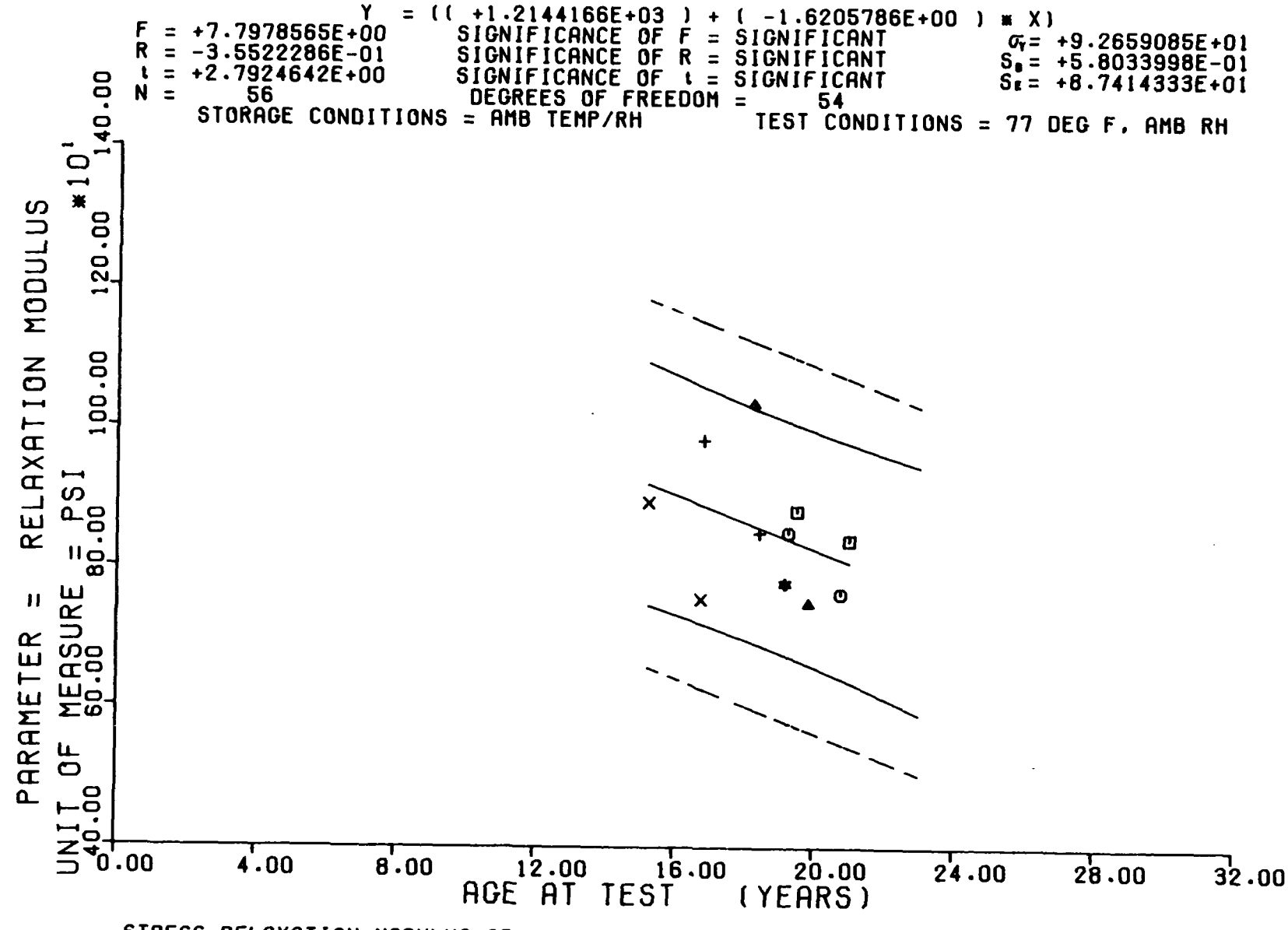
Shore C hardness is shown in figure 3-7 as a visual display. Figures 3-8 thru 3-12 show a significant decrease in each of the motors.

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
183.0	5	+8.9200000E+02	+1.4404860E+01	+9.0500000E+02	+8.7000000E+02	+9.1785058E+02
201.0	5	+7.5400000E+02	+1.5572411E+01	+7.7500000E+02	+7.4000000E+02	+8.8868017E+02
202.0	5	+9.8100000E+02	+4.3214580E+01	+1.0150000E+03	+9.1000000E+02	+8.8705957E+02
219.0	5	+1.0330000E+03	+4.7381430E+01	+1.0700000E+03	+9.5000000E+02	+8.5950976E+02
221.0	5	+8.4900000E+02	+3.7815340E+01	+8.9500000E+02	+8.1000000E+02	+8.5626855E+02
230.0	5	+7.7700000E+02	+2.4135036E+01	+8.0500000E+02	+7.4500000E+02	+8.4168334E+02
231.0	5	+8.4900000E+02	+7.4161984E+00	+8.6000000E+02	+8.4000000E+02	+8.4006298E+02
234.0	6	+8.8000000E+02	+2.6645825E+01	+9.3000000E+02	+8.6000000E+02	+8.3520117E+02
238.0	5	+7.4800000E+02	+2.5396850E+01	+7.8500000E+02	+7.2500000E+02	+8.2871875E+02
249.0	5	+7.6200000E+02	+3.8503246E+01	+8.3000000E+02	+7.4000000E+02	+8.1089233E+02
252.0	5	+8.3800000E+02	+2.3075961E+01	+8.7000000E+02	+8.0500000E+02	+8.0603076E+02

STRESS RELAXATION MODULUS AT 1000 SEC AND 2% STRAIN, SIX MOTOR VISUAL DISPLAY



STRESS RELAXATION MODULUS AT 1000 SEC AND 2% STRAIN, SIX MOTOR VISUAL DISPLAY

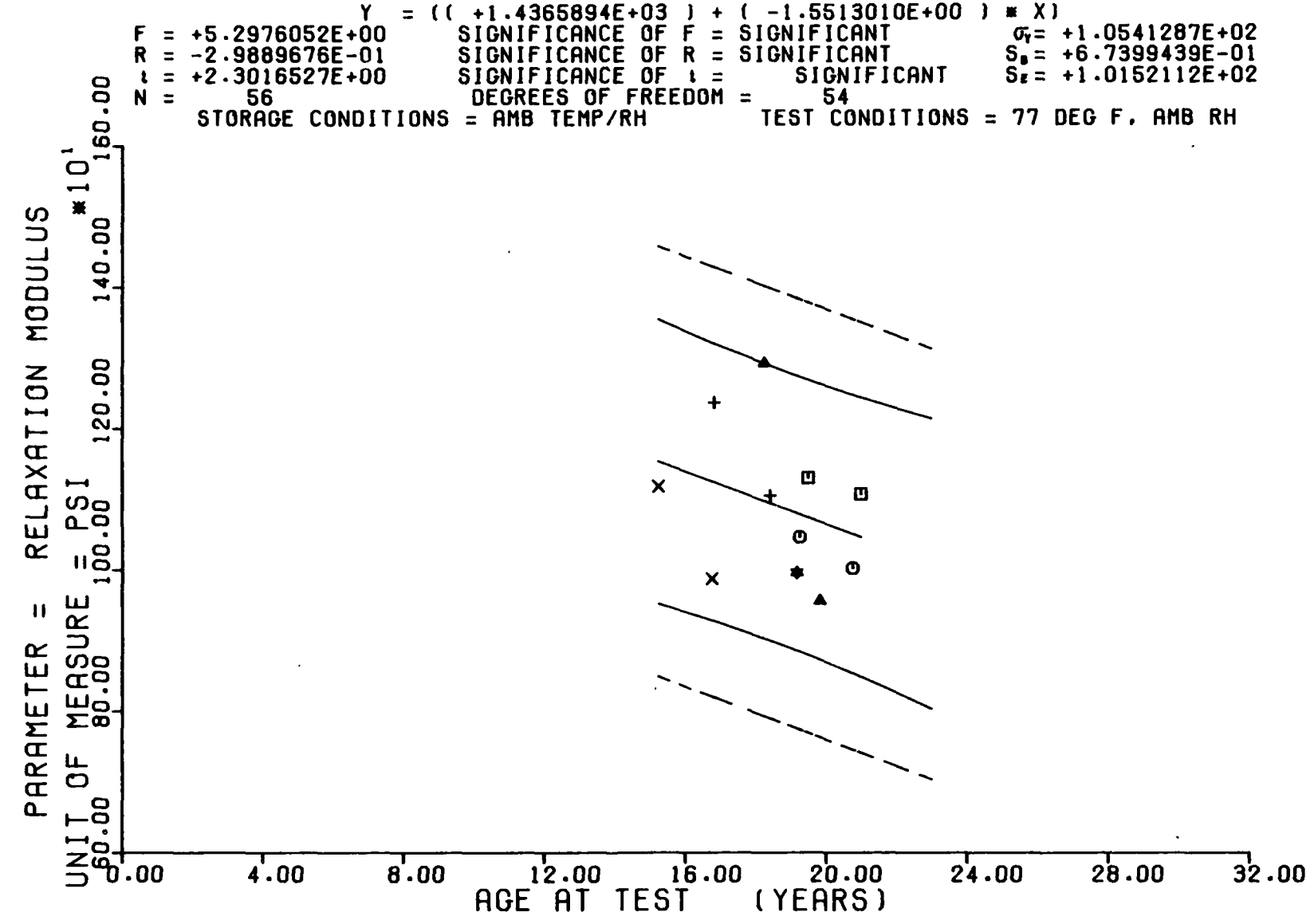
Figure 2-4

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
183.0	5	+1.1180000E+03	+1.6431676E+01	+1.1400000E+03	+1.0950000E+03	+1.1527011E+03
201.0	5	+9.8700000E+02	+1.5247950E+01	+1.0050000E+03	+9.7000000E+02	+1.1247778E+03
202.0	5	+1.2360000E+03	+5.8672821E+01	+1.2800000E+03	+1.1400000E+03	+1.1232265E+03
219.0	5	+1.2920000E+03	+5.3455589E+01	+1.3400000E+03	+1.2000000E+03	+1.0968542E+03
221.0	5	+1.1050000E+03	+3.0822070E+01	+1.1500000E+03	+1.0750000E+03	+1.0937517E+03
230.0	5	+9.9600000E+02	+2.5099800E+01	+1.0250000E+03	+9.6500000E+02	+1.0797900E+03
231.0	5	+1.0460000E+03	+1.0246950E+01	+1.0550000E+03	+1.0300000E+03	+1.0782387E+03
234.0	6	+1.1300000E+03	+3.6193922E+01	+1.1950000E+03	+1.1000000E+03	+1.0735849E+03
238.0	5	+9.5600000E+02	+1.9811612E+01	+9.9000000E+02	+9.4000000E+02	+1.0673796E+03
249.0	5	+1.0020000E+03	+3.5812009E+01	+1.0650000E+03	+9.8000000E+02	+1.0503154E+03
252.0	5	+1.1070000E+03	+2.1679483E+01	+1.1400000E+03	+1.0800000E+03	+1.0456613E+03

STRESS RELAXATION MODULUS AT 100 SEC AND 2% STRAIN, SIX MOTOR VISUAL DISPLAY



STRESS RELAXATION MODULUS AT 100 SEC AND 2% STRAIN, SIX MOTOR VISUAL DISPLAY

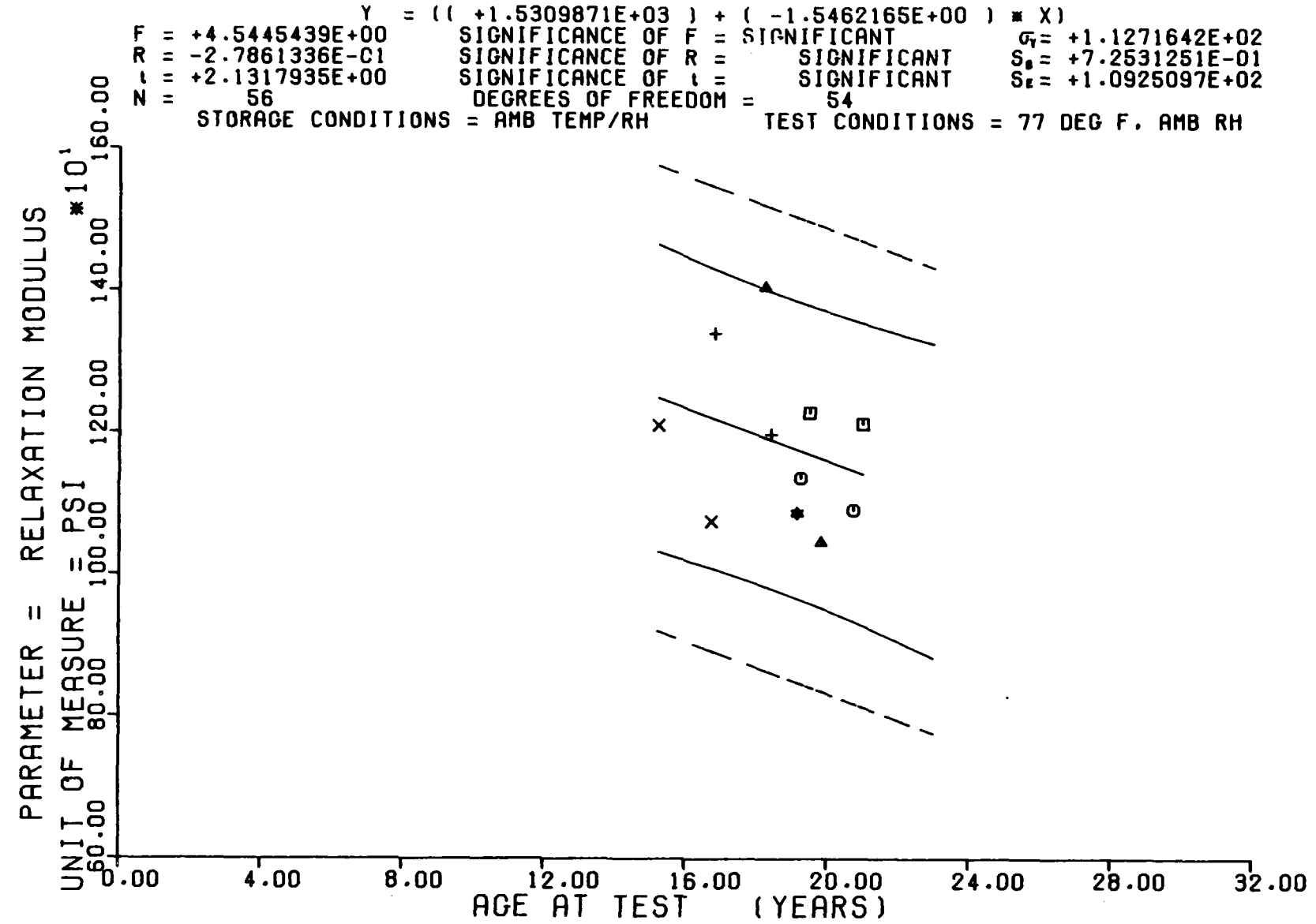
Figure 2-3

****** LINEAR REGRESSION ANALYSIS ******

***** ANALYSIS OF TIME SERIES *****

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
183.0	5	+1.2100000E+03	+1.9999999E+01	+1.2350000E+03	+1.1800000E+03	+1.2480292E+03
201.0	5	+1.0750000E+03	+1.2247448E+01	+1.0900000E+03	+1.0600000E+03	+1.2201975E+03
202.0	5	+1.3400000E+03	+6.4710895E+01	+1.3900000E+03	+1.2350000E+03	+1.2186513E+03
219.0	5	+1.4050000E+03	+5.8630196E+01	+1.4600000E+03	+1.3050000E+03	+1.1923654E+03
221.0	5	+1.1970000E+03	+2.7064737E+01	+1.2350000E+03	+1.1700000E+03	+1.1892731E+03
230.0	5	+1.0870000E+03	+2.1965882E+01	+1.1150000E+03	+1.0600000E+03	+1.1753571E+03
231.0	5	+1.1360000E+03	+1.3416407E+01	+1.1500000E+03	+1.1150000E+03	+1.1738110E+03
234.0	6	+1.2275000E+03	+4.0712405E+01	+1.3000000E+03	+1.1900000E+03	+1.1691723E+03
238.0	5	+1.0450000E+03	+2.0310096E+01	+1.0800000E+03	+1.0300000E+03	+1.1629875E+03
249.0	5	+1.0910000E+03	+3.5951356E+01	+1.1550000E+03	+1.0700000E+03	+1.1459790E+03
252.0	5	+1.2120000E+03	+2.3611437E+01	+1.2450000E+03	+1.1800000E+03	+1.1413403E+03

STRESS RELAXATION MODULUS AT 50 SEC AND 2% STRAIN, SIX MOTOR VISUAL DISPLAY



STRESS RELAXATION MODULUS AT 50 SEC AND 2% STRAIN. SIX MOTOR VISUAL DISPLAY

Figure 2-2

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
193.0	5	+1.5260000E+03	+2.5592967E+01	+1.5650000E+03	+1.4950000E+03	+1.5841303E+03
201.0	5	+1.3920000E+03	+1.4832396E+01	+1.4100000E+03	+1.3750000E+03	+1.5490808E+03
202.0	5	+1.6940000E+03	+8.6631403E+01	+1.7650000E+03	+1.5550000E+03	+1.5471335E+03
219.0	5	+1.7770000E+03	+7.8549347E+01	+1.8550000E+03	+1.6450000E+03	+1.5140310E+03
221.0	5	+1.5440000E+03	+2.7477263E+01	+1.5850000E+03	+1.5150000E+03	+1.5101367E+03
230.0	5	+1.3720000E+03	+3.8013155E+01	+1.4350000E+03	+1.3400000E+03	+1.4926118E+03
231.0	5	+1.4240000E+03	+1.9170289E+01	+1.4400000E+03	+1.3950000E+03	+1.4906645E+03
234.0	6	+1.5558332E+03	+5.5354915E+01	+1.6550000E+03	+1.5050000E+03	+1.4848229E+03
238.0	5	+1.3100000E+03	+1.7677669E+01	+1.3400000E+03	+1.2950000E+03	+1.4770341E+03
249.0	5	+1.3920000E+03	+3.0331501E+01	+1.4450000E+03	+1.3750000E+03	+1.4556149E+03
252.0	5	+1.5540000E+03	+2.2472205E+01	+1.5850000E+03	+1.5250000E+03	+1.4497734E+03

STRESS RELAXATION MODULUS AT 10 SEC AND 2% STRAIN, SIX MOTOR VISUAL DISPLAY

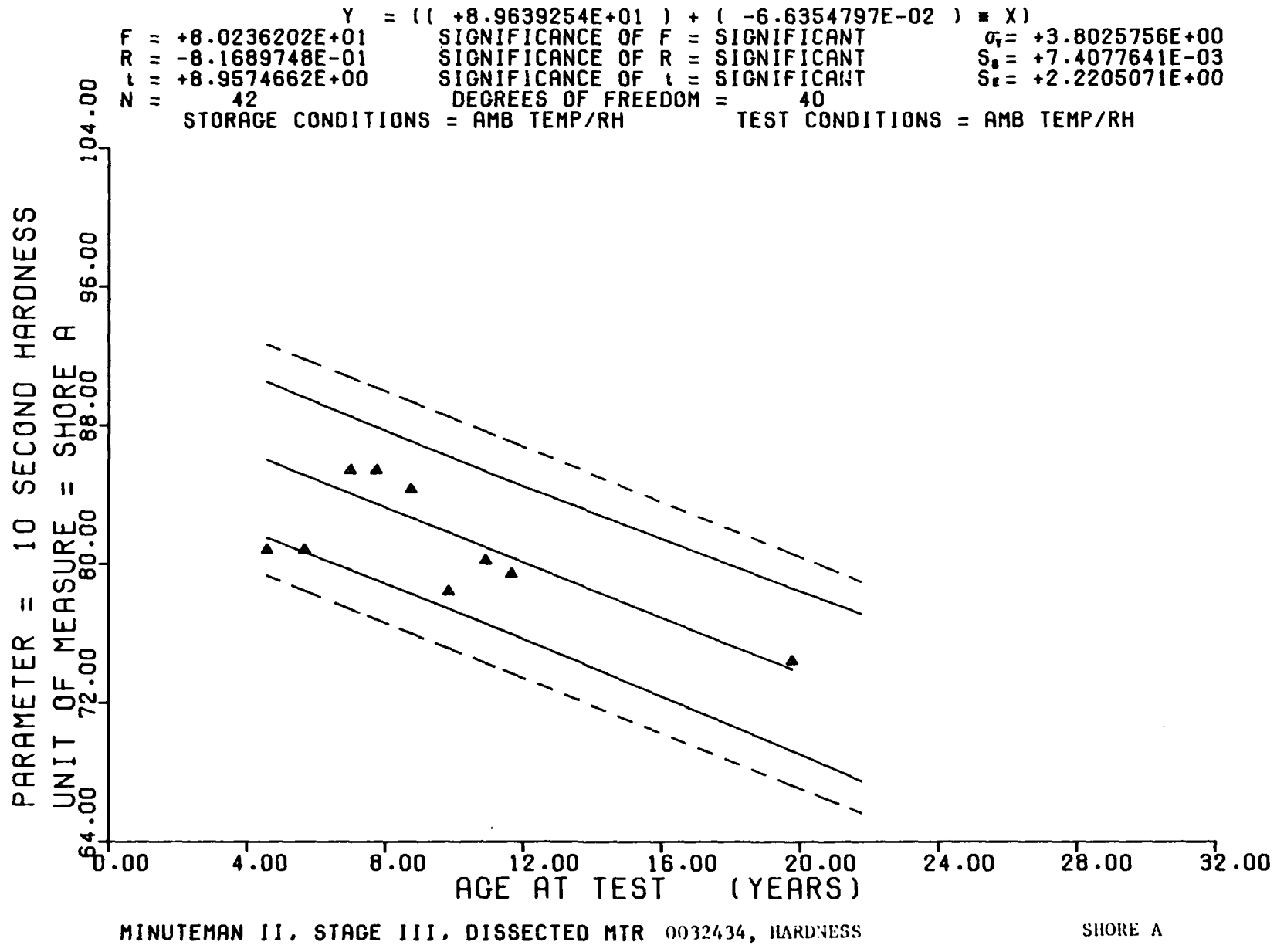

Y = ((+8.9639254E+01) + (-6.6354797E-02) * X)
F = +8.0236202E+01 SIGNIFICANCE OF F = SIGNIFICANT σY = +3.8025756E+00
R = -8.1689748E-01 SIGNIFICANCE OF R = SIGNIFICANT SB = +7.4077641E-03
t = +8.9574662E+00 SIGNIFICANCE OF t = SIGNIFICANT SE = +2.2205071E+00
N = 42 DEGREES OF FREEDOM = 40
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = 10 SECOND HARDNESS
UNIT OF MEASURE = SHORE A
104.00
96.00
88.00
80.00
72.00
64.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
MINUTEMAN II, STAGE III, DISSECTED MTR 0032434, HARDNESS SHORE A

Figure 3-4

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (KILLED)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
55.0	1	+8.0799987E+01	+0.0000000E+07	+8.0799987E+01	+8.0799987E+01	+8.5989730E+01
65.0	1	+8.0799987E+01	+0.0000000E+07	+8.0799987E+01	+8.0799987E+01	+8.5127120E+01
74.0	5	+8.5399993E+01	+5.4772255E-01	+8.6000000E+01	+8.5000000E+01	+8.4065444E+01
75.0	5	+8.5399993E+01	+5.4772255E-01	+8.6000000E+01	+8.5000000E+01	+8.3468246E+01
105.0	10	+8.4299987E+01	+1.3374935E+00	+8.6000000E+01	+8.3000000E+01	+8.2671997E+01
115.0	5	+7.8399993E+01	+1.1401754E+00	+8.0000000E+01	+7.7000000E+01	+8.1809387E+01
131.0	5	+8.0199996E+01	+1.0954451E+00	+8.1000000E+01	+7.9000000E+01	+8.0946762E+01
140.0	5	+7.8399993E+01	+5.4772255E-01	+8.0000000E+01	+7.9000000E+01	+8.0349578E+01
257.0	5	+7.4399993E+01	+5.4772255E-01	+7.6000000E+01	+7.4000000E+01	+7.3913152E+01

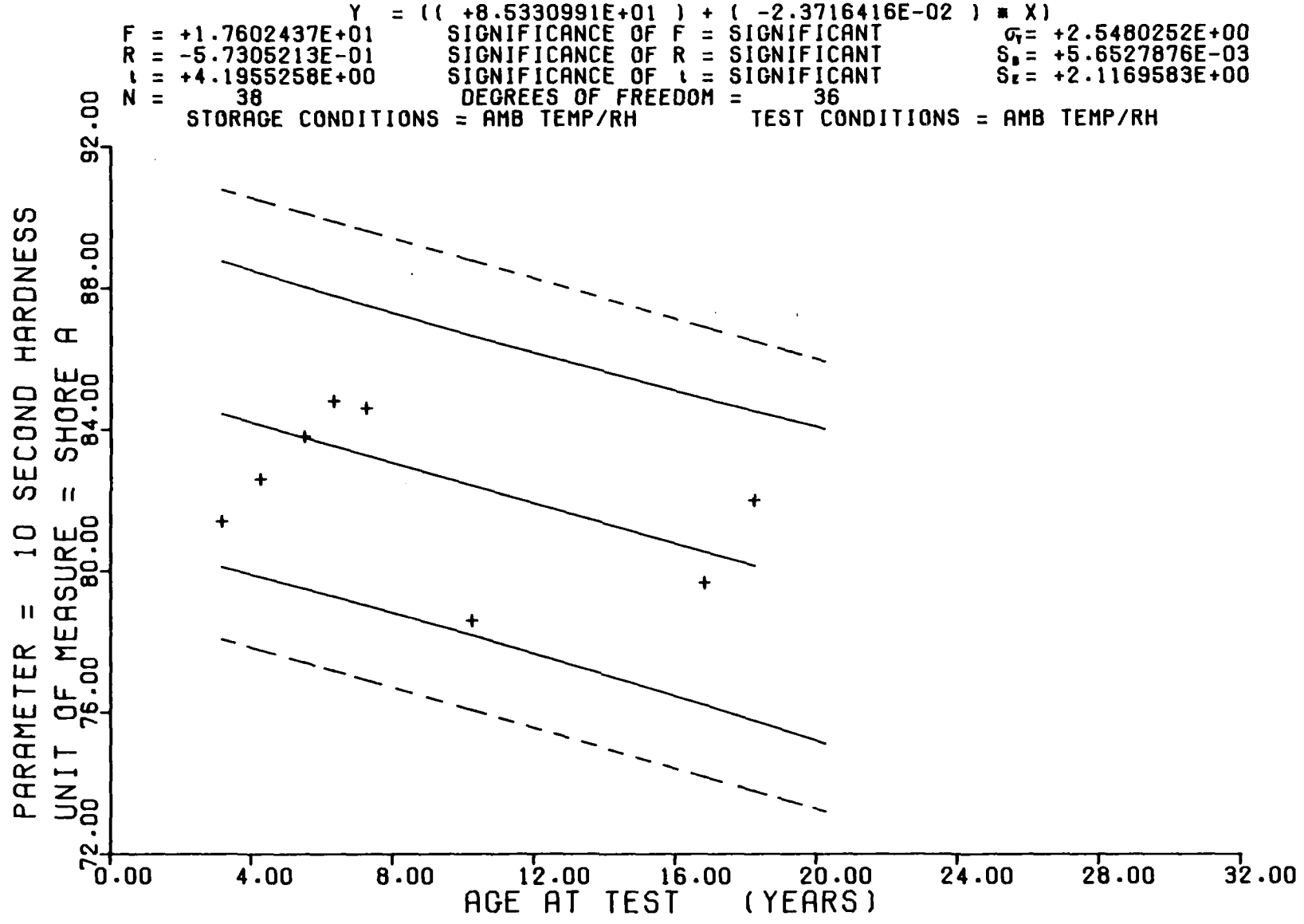

Y = ((+8.5330991E+01) + (-2.3716416E-02) * X)
F = +1.7602437E+01 SIGNIFICANCE OF F = SIGNIFICANT σY = +2.5480252E+00
R = -5.7305213E-01 SIGNIFICANCE OF R = SIGNIFICANT Sβ = +5.6527876E-03
t = +4.1955258E+00 SIGNIFICANCE OF t = SIGNIFICANT Sε = +2.1169583E+00
N = 38 DEGREES OF FREEDOM = 36
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = 10 SECOND HARDNESS
UNIT OF MEASURE = SHORE A
92.00
88.00
84.00
80.00
76.00
72.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
MINUTEMAN II, STAGE III, DISSECTED MTR 0032831, HARDNESS SHORE A

Figure 3-5

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
[illegible]	1	+8.1399993E+01	+0.0000000E+07	+8.1399993E+01	+8.1399993E+01	+8.4429763E+01
31.0	1	+8.2599990E+01	+0.0000000E+07	+8.2599990E+01	+8.2599990E+01	+8.4121444E+01
[illegible]	5	+8.3799987E+01	+8.3666002E-01	+8.5000000E+01	+8.3000000E+01	+8.3765701E+01
79.0	10	+8.4799987E+01	+7.6681063E-01	+8.6000000E+01	+8.4000000E+01	+8.3528534E+01
87.0	5	+8.4599991E+01	+5.4773255E-01	+8.5000000E+01	+8.4000000E+01	+8.3267654E+01
123.0	5	+7.8599993E+01	+2.0736441E+00	+8.0000000E+01	+7.5000000E+01	+8.2413864E+01
203.0	6	+7.9666656E+01	+8.1643658E-01	+8.1000000E+01	+7.9000000E+01	+8.0540267E+01
219.0	5	+8.2000000E+01	+0.0000000E+07	+8.2000000E+01	+8.2000000E+01	+8.0137084E+01

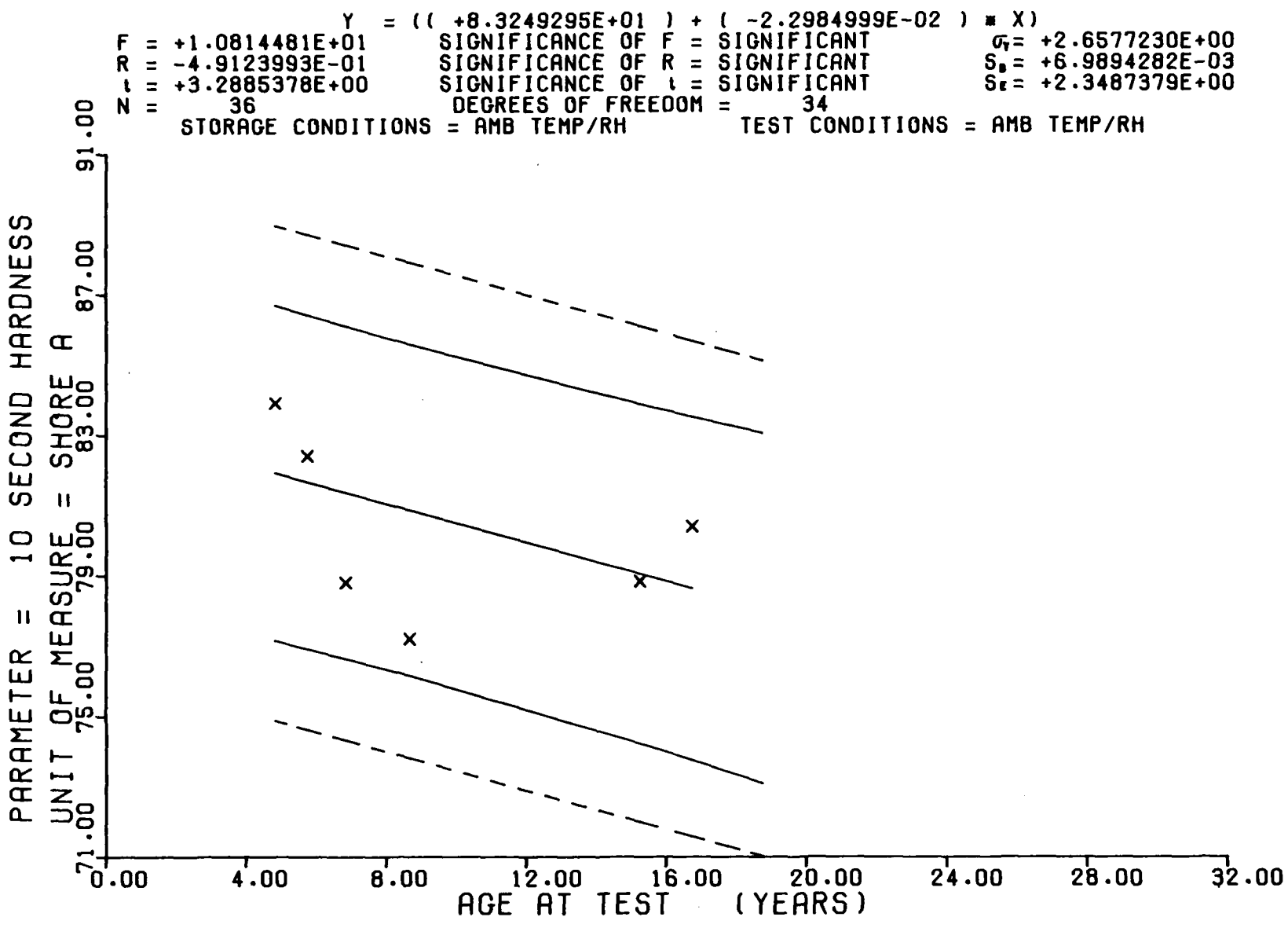

Y = ((+8.3249295E+01) + (-2.2984999E-02) * X)
F = +1.0814481E+01 SIGNIFICANCE OF F = SIGNIFICANT σy = +2.6577230E+00
R = -4.9123993E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +6.9894282E-03
t = +3.2885378E+00 SIGNIFICANCE OF t = SIGNIFICANT Se = +2.3487379E+00
N = 36 DEGREES OF FREEDOM = 34
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = 10 SECOND HARDNESS
UNIT OF MEASURE = SHORE A
91.00
87.00
83.00
79.00
75.00
71.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
MINUTEMAN II, STAGE III, DISSECTED MTR 0033174, HARDNESS
SHORE A

Figure 3-6

*** LINEAR REGRESSION ANALYSIS ***

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
50.0	10	+8.3829993E+01	+1.1005049E+00	+8.6000000E+01	+8.2000000E+01	+8.1916152E+01
72.0	5	+8.2599993E+01	+5.4772259E-01	+8.3000000E+01	+8.2000000E+01	+8.1663330E+01
88.0	5	+7.9799987E+01	+4.4721359E-01	+7.9000000E+01	+7.8000000E+01	+8.1364517E+01
104.0	5	+7.7199996E+01	+1.3038404E+00	+7.9000000E+01	+7.6000000E+01	+8.0858840E+01
193.0	6	+7.6833326E+01	+1.1690451E+00	+8.0000000E+01	+7.7000000E+01	+7.9043029E+01
201.0	5	+8.0399993E+01	+3.9442719E-01	+8.1000000E+01	+7.9000000E+01	+7.8629302E+01

MINUTEMAN II, STAGE III, DISSECTED MTK <00331?4>

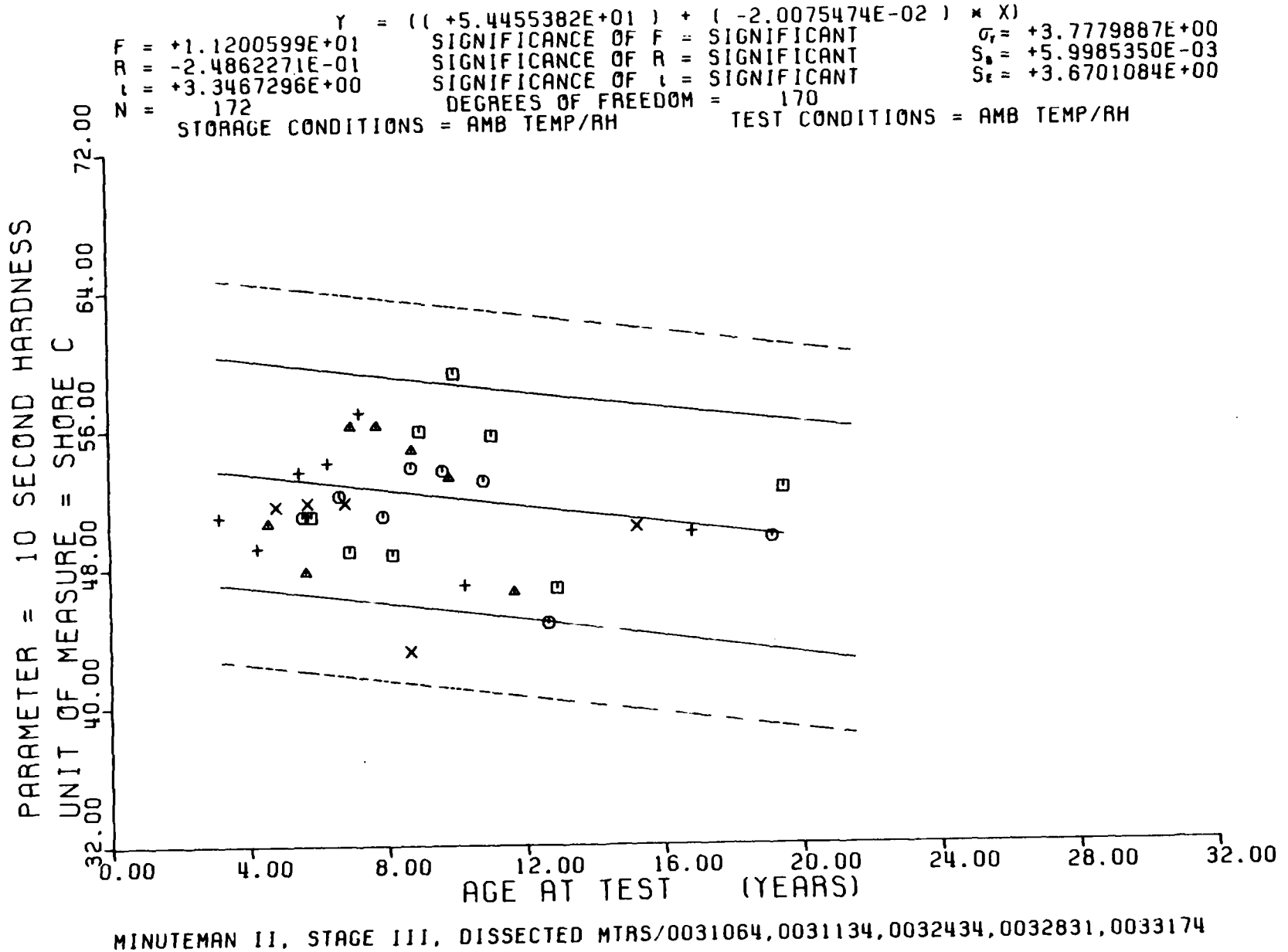

Y = ((+5.4455382E+01) + (-2.0075474E-02) * X)
F = +1.1200599E+01 SIGNIFICANCE OF F = SIGNIFICANT
R = -2.4862271E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +3.3467296E+00 SIGNIFICANCE OF t = SIGNIFICANT
N = 172 DEGREES OF FREEDOM = 170
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = 10 SECOND HARDNESS
UNIT OF MEASURE = SHORE C
72.00
64.00
56.00
48.00
40.00
32.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
MINUTEMAN II, STAGE III, DISSECTED MTRS/0031064,0031134,0032434,0032831,0033174

Figure 3-7

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
38.0	1	130.0	5
51.0	1	133.0	5
56.0	1	140.0	5
58.0	10	152.0	5
66.0	5	155.0	5
67.0	1	183.0	6
68.0	1	201.0	5
69.0	5	202.0	6
70.0	1	219.0	5
76.0	10	230.0	6
80.0	1	234.0	6
82.0	5	237.0	5
83.0	1	248.0	5
84.0	5	252.0	5
87.0	5		
93.0	5		
95.0	5		
98.0	5		
104.0	5		
105.0	20		
108.0	10		
110.0	5		
113.0	5		
120.0	5		
125.0	5		

MINUTEMAN II, STAGE III, DISSECTED 4TRS/0031064,0031134,0032434,0032831,0033174

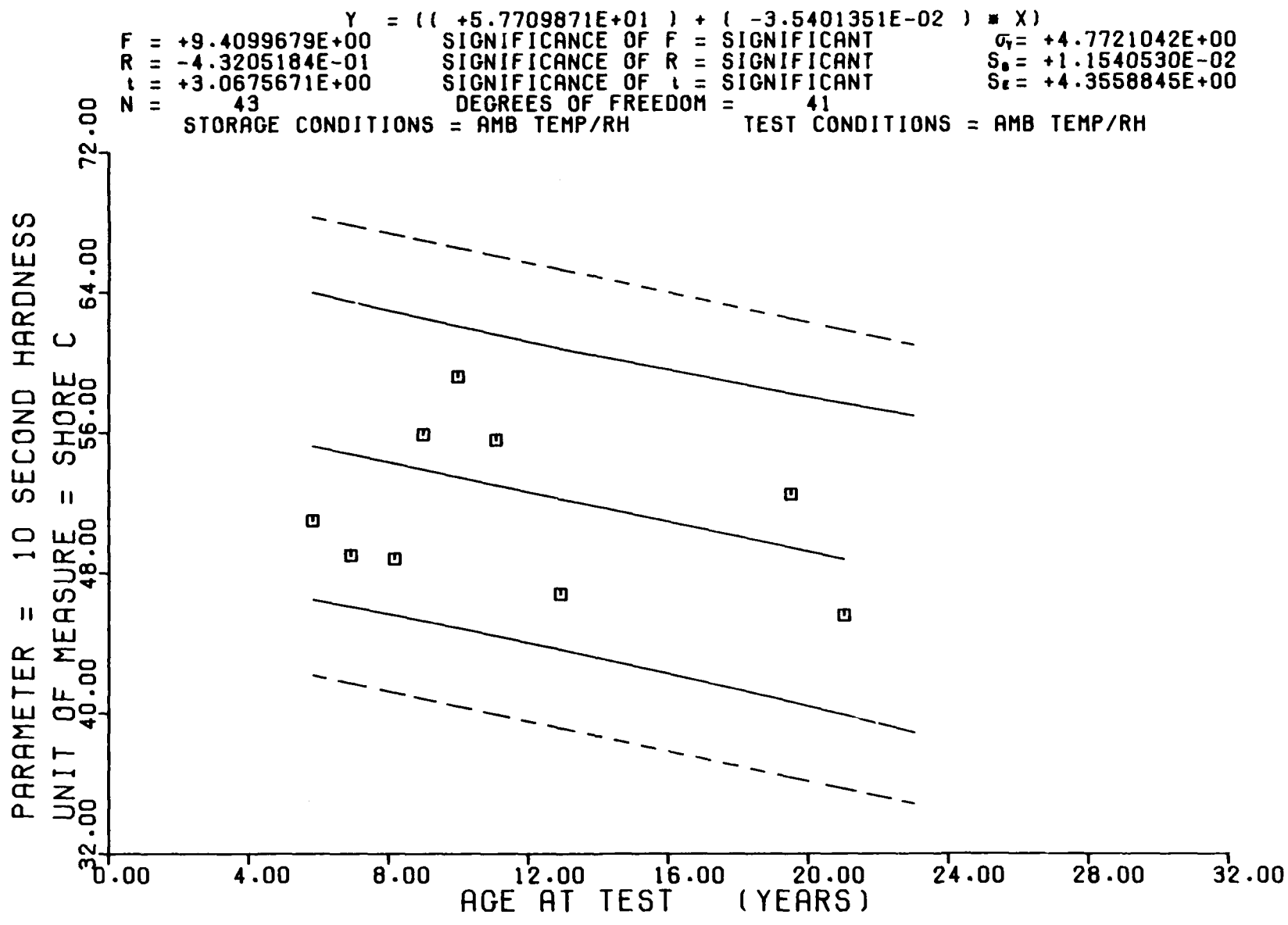

Y = ((+5.7709871E+01) + (-3.5401351E-02) * X)
F = +9.4099679E+00 SIGNIFICANCE OF F = SIGNIFICANT σY = +4.7721042E+00
R = -4.3205184E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +1.1540530E-02
t = +3.0675671E+00 SIGNIFICANCE OF t = SIGNIFICANT Se = +4.3558845E+00
N = 43 DEGREES OF FREEDOM = 41
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = 10 SECOND HARDNESS
UNIT OF MEASURE = SHORE C
72.00
64.00
56.00
48.00
40.00
32.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
MINUTEMAN II, STAGE III, DISSECTED MTR 0031064, 10 sec HARDNESS , SHORE C

Figure 3-8

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
78.0	1	+5.1000000E+01	+0.0000000E+07	+5.1000000E+01	+5.1000000E+01	+5.5231765E+01
108.0	1	+4.9000000E+01	+0.0000000E+07	+4.9000000E+01	+4.9000000E+01	+5.4771545E+01
138.0	5	+4.8799987E+01	+5.3662002E-01	+5.0000000E+01	+4.8000000E+01	+5.4240524E+01
168.0	10	+5.0899993E+01	+2.2827856E+00	+5.3000000E+01	+5.2000000E+01	+5.3886520E+01
198.0	5	+5.0199996E+01	+8.3666002E-01	+5.0000000E+01	+5.8000000E+01	+5.3461700E+01
228.0	5	+5.0599990E+01	+1.3416407E+00	+5.7000000E+01	+5.4000000E+01	+5.3001480E+01
258.0	5	+4.8799987E+01	+1.4832496E+00	+4.9000000E+01	+4.5000000E+01	+5.2222656E+01
294.0	6	+5.2500000E+01	+1.5165750E+00	+5.4000000E+01	+5.0000000E+01	+4.9425949E+01
342.0	5	+4.5599990E+01	+1.1401754E+00	+4.7000000E+01	+4.4000000E+01	+4.8788726E+01

HEGEMAN II, STAGE III, DISSECTED MTR <JJ31064>

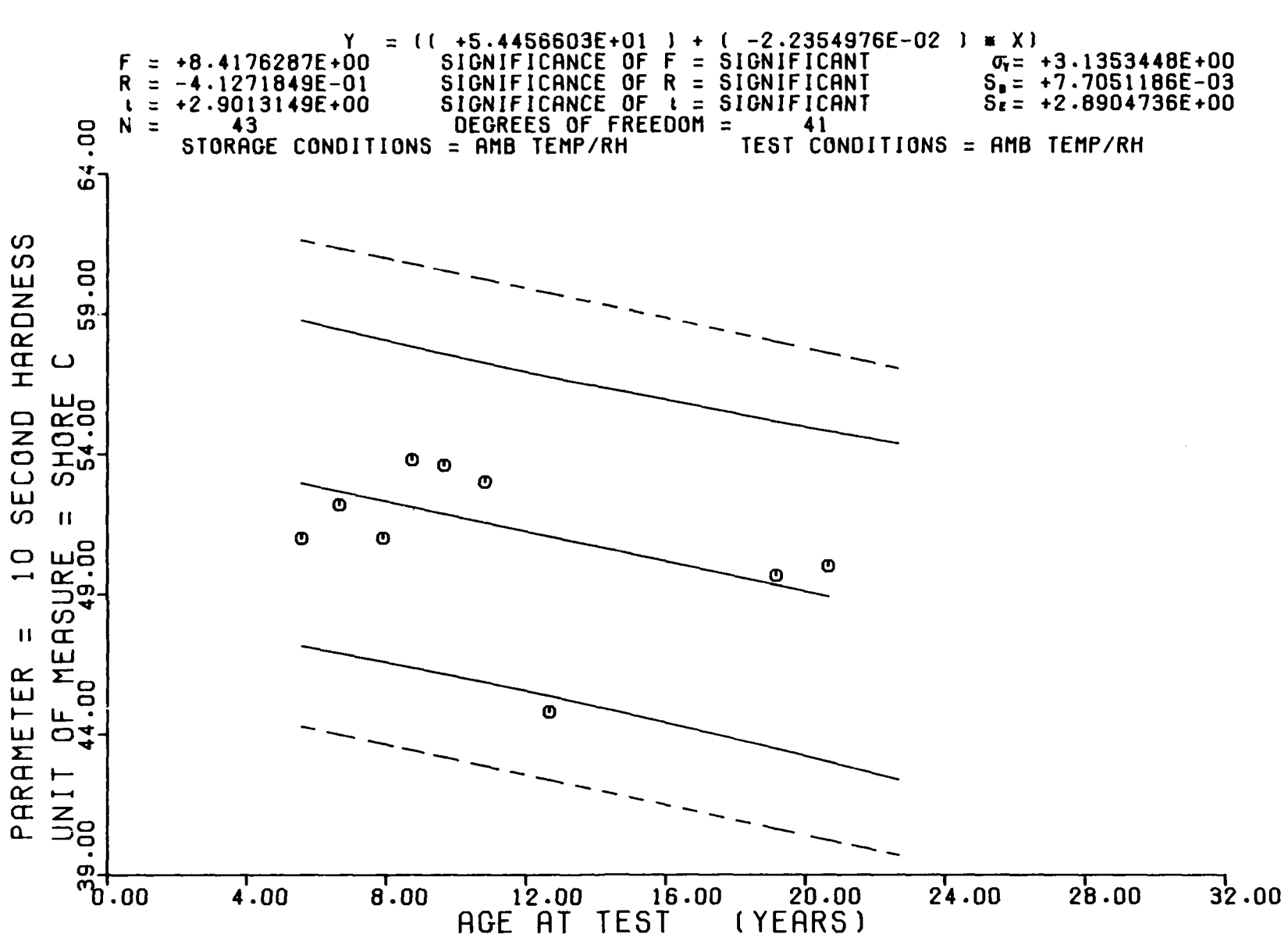

Y = ((+5.4456603E+01) + (-2.2354976E-02) * X)
F = +8.4176287E+00 SIGNIFICANCE OF F = SIGNIFICANT
R = -4.1271849E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +2.9013149E+00 SIGNIFICANCE OF t = SIGNIFICANT
N = 43 DEGREES OF FREEDOM = 41
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = 10 SECOND HARDNESS
UNIT OF MEASURE = SHORE C
64.00
59.00
54.00
49.00
44.00
39.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
MINUTEMAN II, STAGE III, DISSECTED MTR 0031134, 10 sec , HARDNESS, SHORE C

Figure 3-9

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

X (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
67.0	1	+5.1000000E+01	+0.0000000E+07	+5.1000000E+01	+5.1000000E+01	+5.2958816E+01
80.0	1	+5.2199996E+01	+0.0000000E+07	+5.2199996E+01	+5.2199996E+01	+5.2668197E+01
92.0	5	+5.1000000E+01	+7.0710678E-01	+5.2000000E+01	+5.0000000E+01	+5.2332870E+01
105.0	10	+5.3799987E+01	+1.3934117E+00	+5.6000000E+01	+5.2000000E+01	+5.2109329E+01
116.0	5	+5.3599990E+01	+1.5165750E+00	+5.5000000E+01	+5.2000000E+01	+5.1863418E+01
130.0	5	+5.2000000E+01	+1.4142135E+00	+5.5000000E+01	+5.2000000E+01	+5.1550445E+01
152.0	5	+4.4799987E+01	+2.7748873E+00	+4.7000000E+01	+4.0000000E+01	+5.1058639E+01
200.0	6	+4.9666656E+01	+5.1639777E-01	+5.0000000E+01	+4.9000000E+01	+4.9314956E+01
243.0	5	+5.0000000E+01	+1.0000000E+00	+5.1000000E+01	+4.9000000E+01	+4.8912567E+01

MINUTEMAN II, STAGE III, DISSECTED MTR <00031134>

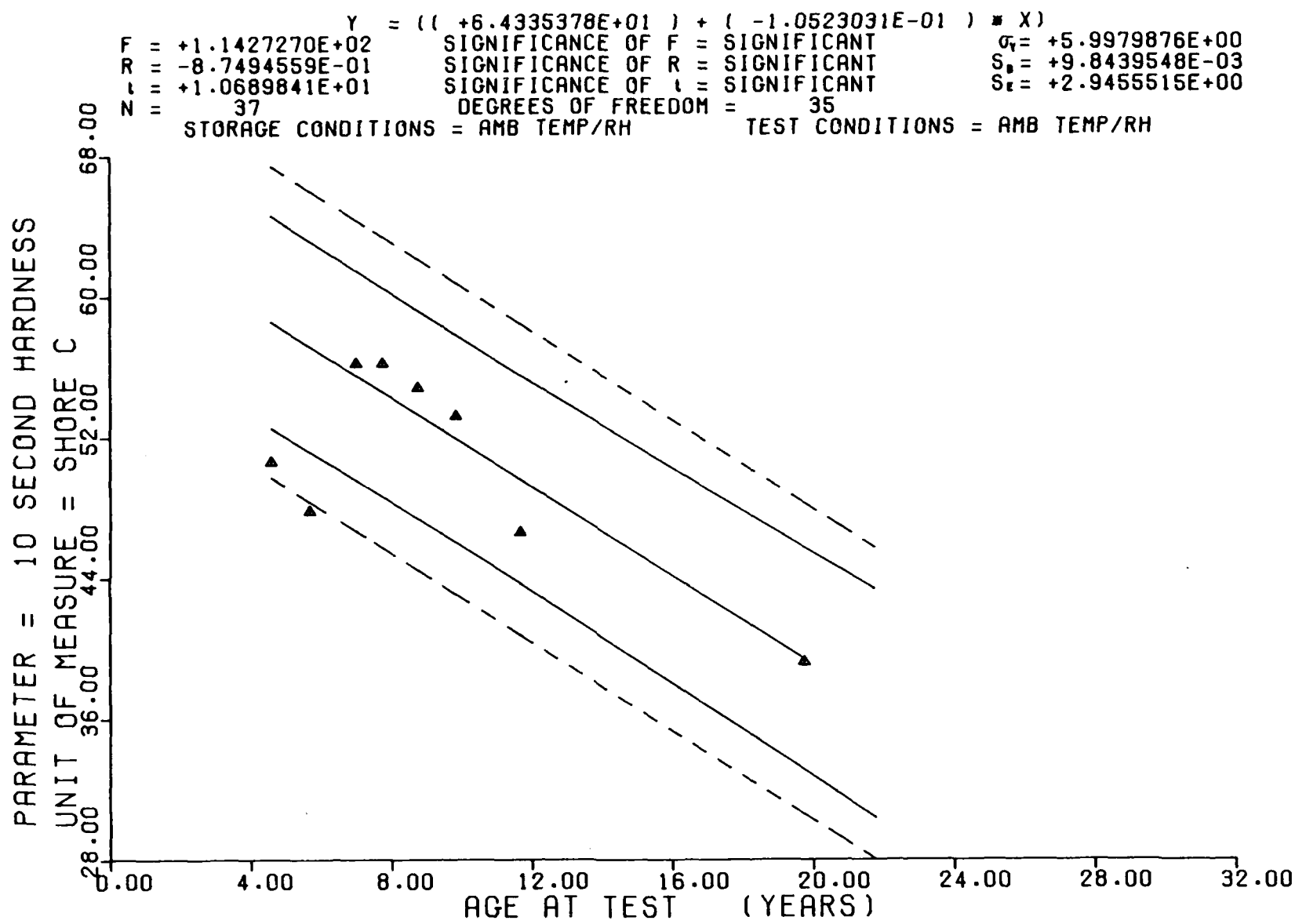

Y = ((+6.4335378E+01) + (-1.0523031E-01) * X)
F = +1.1427270E+02 SIGNIFICANCE OF F = SIGNIFICANT σy = +5.9979876E+00
R = -8.7494559E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +9.8439548E-03
t = +1.0689841E+01 SIGNIFICANCE OF t = SIGNIFICANT Se = +2.9455515E+00
N = 37 DEGREES OF FREEDOM = 35
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = 10 SECOND HARDNESS
UNIT OF MEASURE = SHORE C
68.00
60.00
52.00
44.00
36.00
28.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
MINUTEMAN II, STAGE III, DISSECTED MTR 0032434, 10 sec HARDNESS , SHORE C

Figure 3-10

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (YEARS)	OBSERVATIONS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
[illegible]	1	+5.059999[illegible]E+01	+0.000000[illegible]E+07	+5.059999[illegible]E+01	+5.059999[illegible]E+01	+5.[illegible]E+01
[illegible]	1	+4.779999[illegible]E+01	+0.000000[illegible]E+07	+4.779999[illegible]E+01	+4.779999[illegible]E+01	+5.7179702E+01
[illegible]	5	+5.[illegible]E+01	+1.4632396E+00	+5.[illegible]E+01	+5.4000000E+01	+5.5498017E+01
[illegible]	5	+5.[illegible]E+01	+1.3954451E+00	+5.[illegible]E+01	+5.5000000E+01	+5.4542950E+01
130.0	10	+5.479999[illegible]E+01	+1.6193277E+00	+5.[illegible]E+01	+5.3000000E+01	+5.3286193E+01
140.0	5	+5.319999[illegible]E+01	+1.3033404E+00	+5.[illegible]E+01	+5.2000000E+01	+5.1918197E+01
150.0	5	+4.059999[illegible]E+01	+1.1401754E+00	+4.[illegible]E+01	+4.5000000E+01	+4.9603134E+01
157.0	5	+3.919999[illegible]E+01	+1.0431676E+00	+4.[illegible]E+01	+3.8000000E+01	+3.9395782E+01

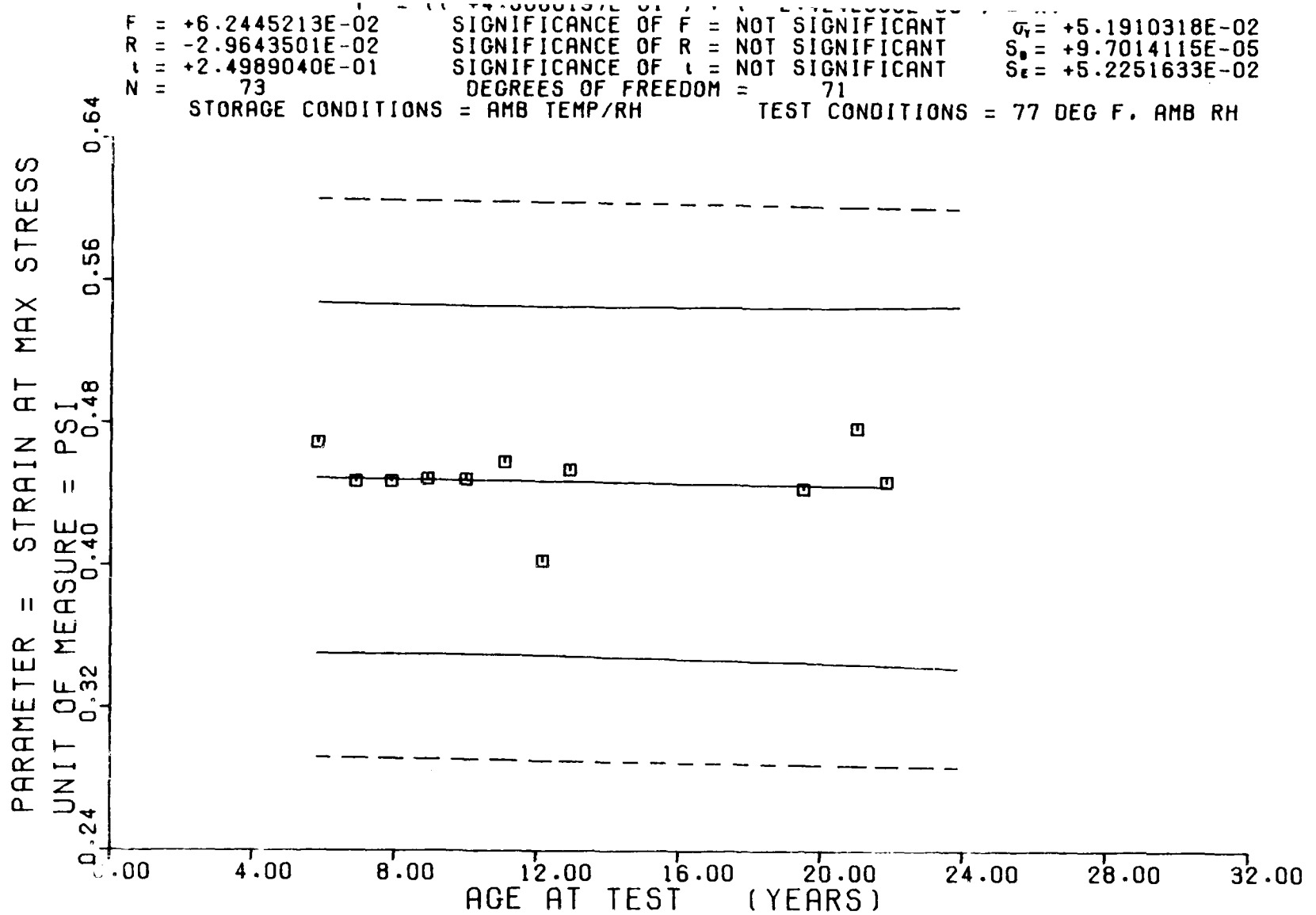

F = +6.2445213E-02
SIGNIFICANCE OF F = NOT SIGNIFICANT
σ_Y = +5.1910318E-02
R = -2.9643501E-02
SIGNIFICANCE OF R = NOT SIGNIFICANT
S_B = +9.7014115E-05
ι = +2.4989040E-01
SIGNIFICANCE OF ι = NOT SIGNIFICANT
S_E = +5.2251633E-02
N = 73
DEGREES OF FREEDOM = 71
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = 77 DEG F, AMB RH
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = PSI
0.24
0.32
0.40
0.48
0.56
0.64
.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, STRAIN AT MAX, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031064.

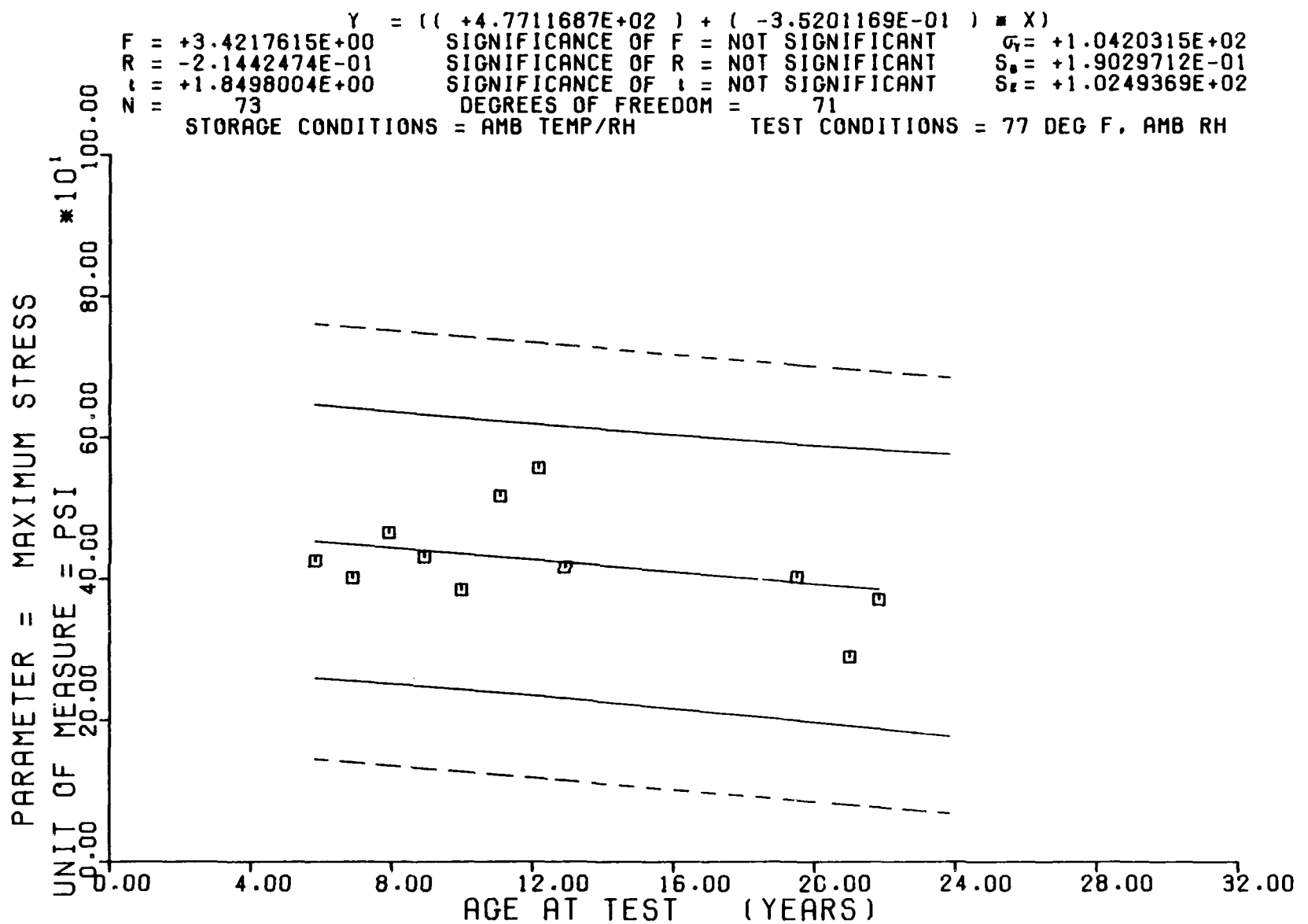
Figure 4-7

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

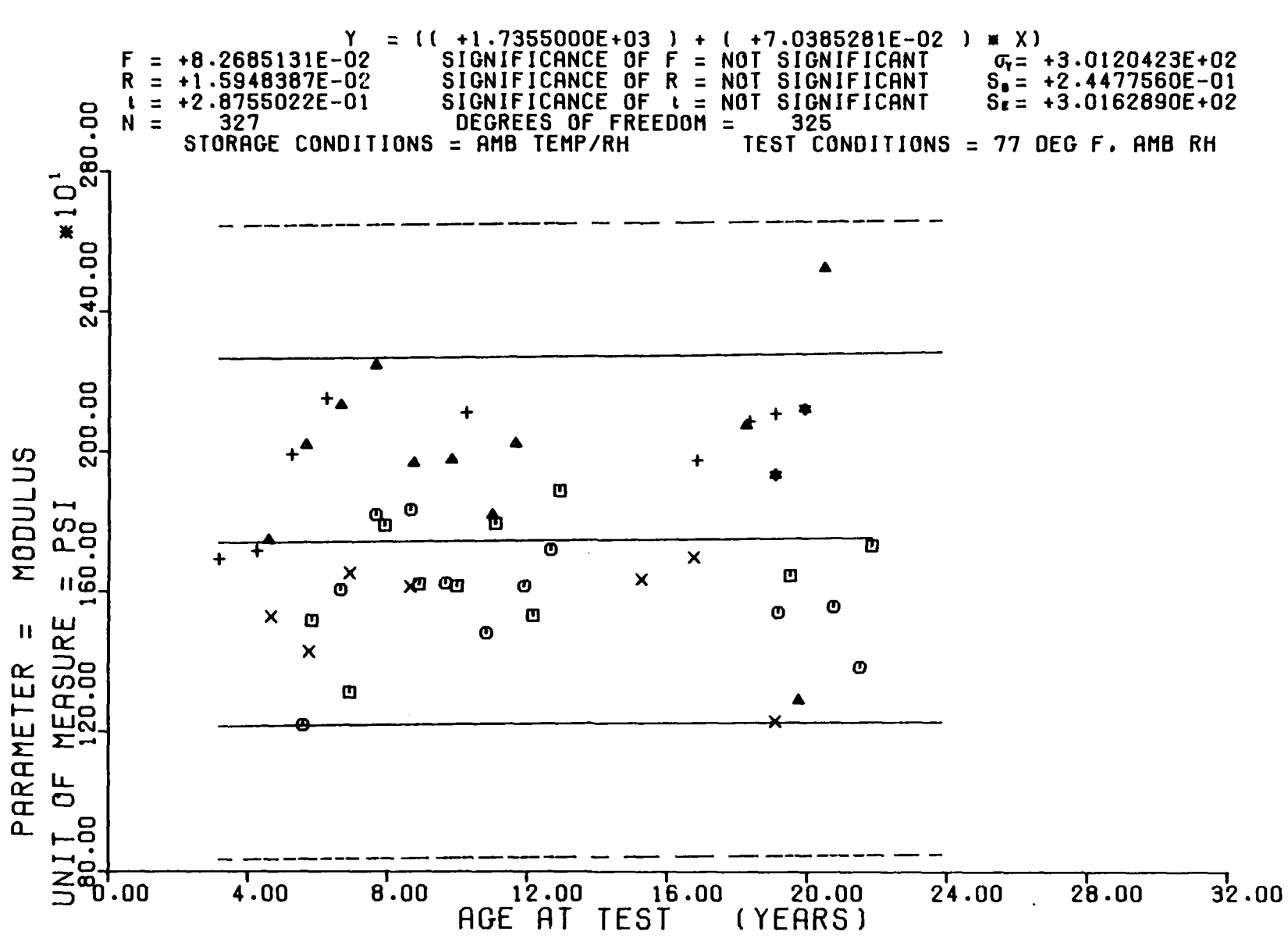
AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
70.0	10	+4.2519995E+02	+1.0726913E+01	+4.4500000E+02	+4.1200000E+02	+4.5247583E+02
83.0	10	+4.0100000E+02	+5.6764621E+00	+4.1000000E+02	+3.9000000E+02	+4.4789990E+02
95.0	10	+4.4500000E+02	+6.2360956E+00	+4.8000000E+02	+4.6000000E+02	+4.4367553E+02
107.0	10	+4.3079980E+02	+1.3554826E+01	+4.5300000E+02	+4.1300000E+02	+4.3945141E+02
120.0	5	+3.8395971E+02	+7.2799715E+00	+3.9459985E+02	+3.7539990E+02	+4.3487524E+02
133.0	3	+5.1666650E+02	+1.9731531E+01	+5.3000000E+02	+4.9400000E+02	+4.3029931E+02
146.0	8	+5.5602978E+02	+2.6587161E+02	+1.2130998E+03	+4.4400000E+02	+4.2572314E+02
195.0	2	+4.1587475E+02	+3.1991114E+00	+4.1811987E+02	+4.1362988E+02	+4.2255493E+02
234.0	6	+4.0242651E+02	+6.8941651E+00	+4.1176977E+02	+3.9221997E+02	+3.9474609E+02
252.0	4	+2.8990234E+02	+2.8445475E+00	+2.9300976E+02	+2.8615991E+02	+3.8840991E+02
262.0	5	+3.7076171E+02	+8.3824962E+00	+3.8378979E+02	+3.6450976E+02	+3.8488964E+02

UNIAXIAL TENSILE, MAXIMUM STRESS, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031064.



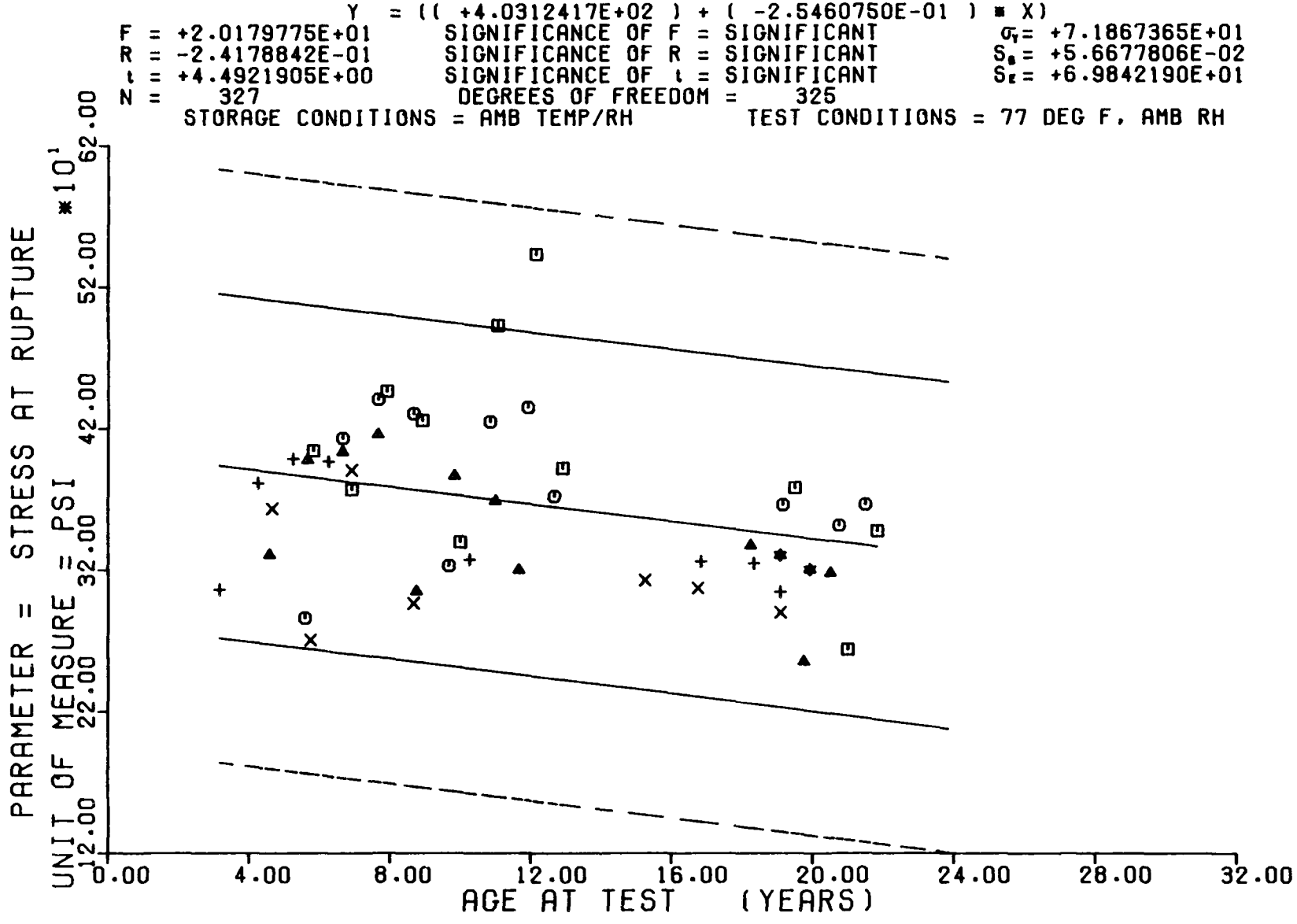
UNIAXIAL TENSILE, MAXIMUM STRESS, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031064.

Figure 4-6



UNIAXIAL TENSILE, MODULUS, 2.0 IN/MIN AT 77 DEG F, SIX MOTOR DISPLAY

Figure 4-5



UNIAXIAL TENSILE, STRESS AT RUP, 2.0 IN/MIN AT 77 DEG F, SIX MOTOR DISPLAY

Figure 4-4

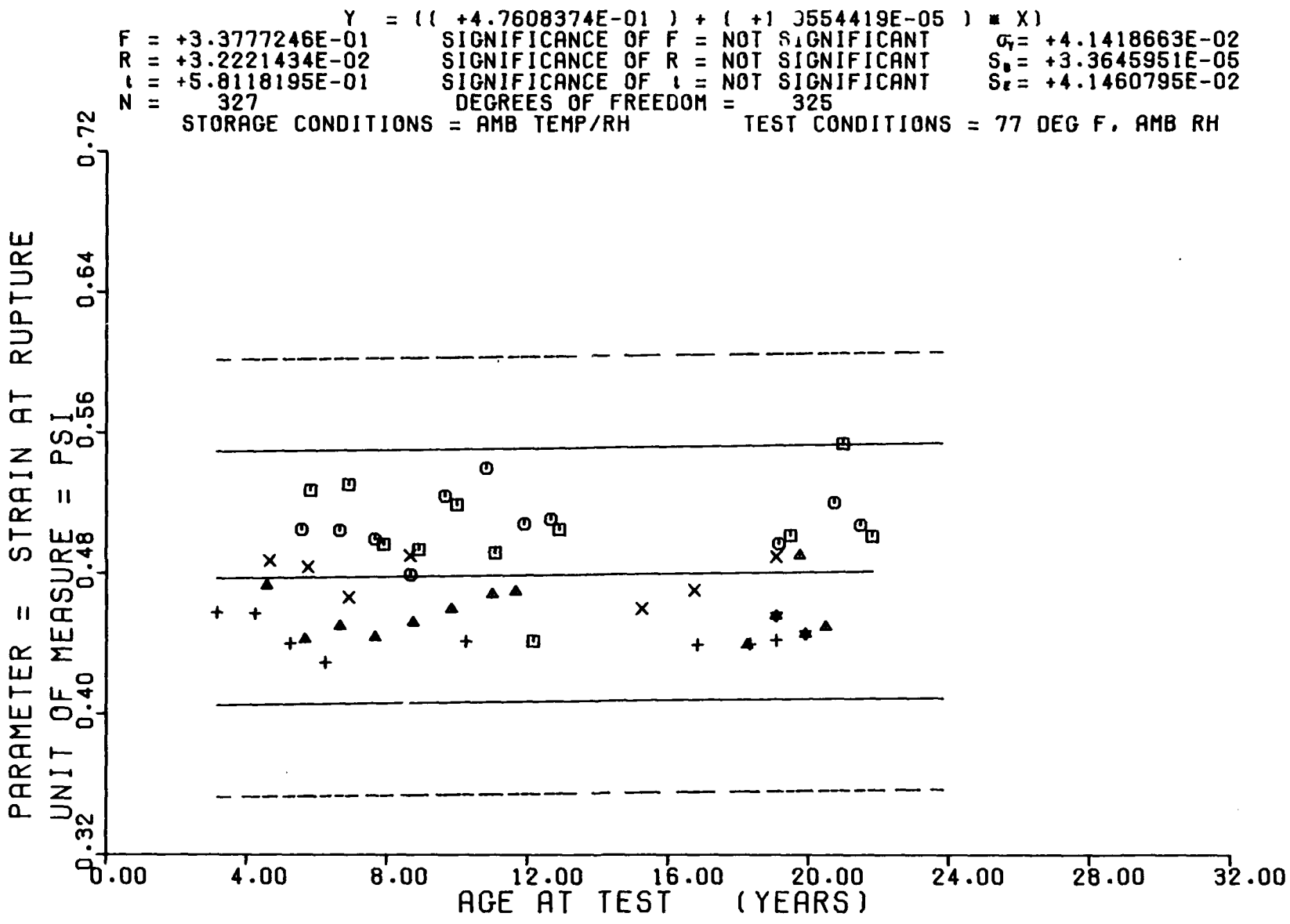

Y = ((+4.7608374E-01) + (+1.0554419E-05) * X)
F = +3.3777246E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT σ = +4.1418663E-02
R = +3.2221434E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT S = +3.3645951E-05
t = +5.8118195E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT S = +4.1460795E-02
N = 327 DEGREES OF FREEDOM = 325
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG F, AMB RH
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = PSI
0.72
0.64
0.56
0.48
0.40
0.32
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, STRAIN AT RUP, 2.0 IN/MIN AT 77 DEG F, SIX MOTOR DISPLAY

Figure 4-3

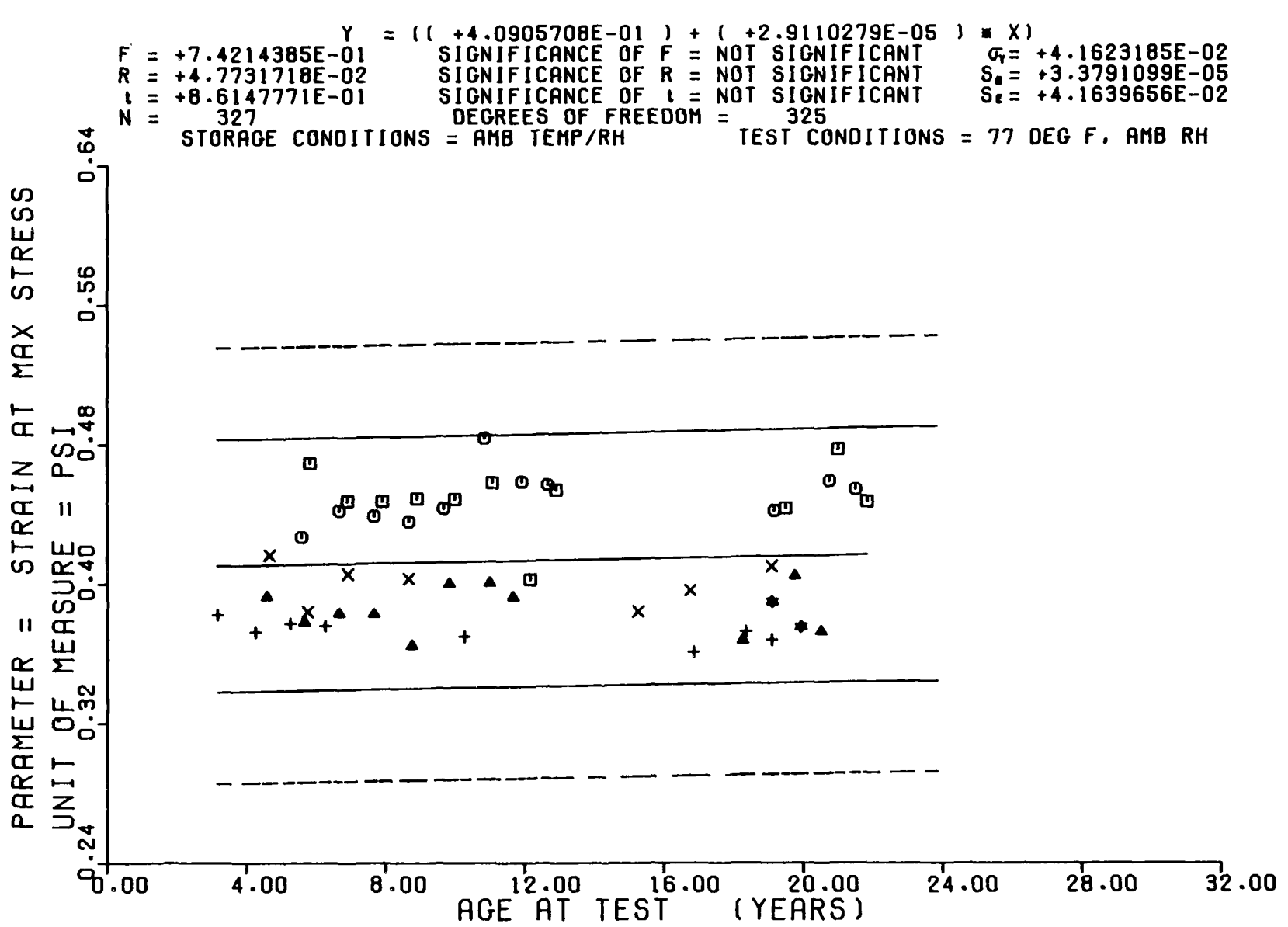

Y = ((+4.0905708E-01) + (+2.9110279E-05) * X)
F = +7.4214385E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT σY= +4.1623185E-02
R = +4.7731718E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT Sb= +3.3791099E-05
t = +8.6147771E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT Se= +4.1639656E-02
N = 327 DEGREES OF FREEDOM = 325
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG F, AMB RH
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = PSI
0.64
0.56
0.48
0.40
0.32
0.24
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, STRAIN AT MAX, 2.0 IN/MIN AT 77 DEG F, SIX MOTOR DISPLAY

Figure 4-2

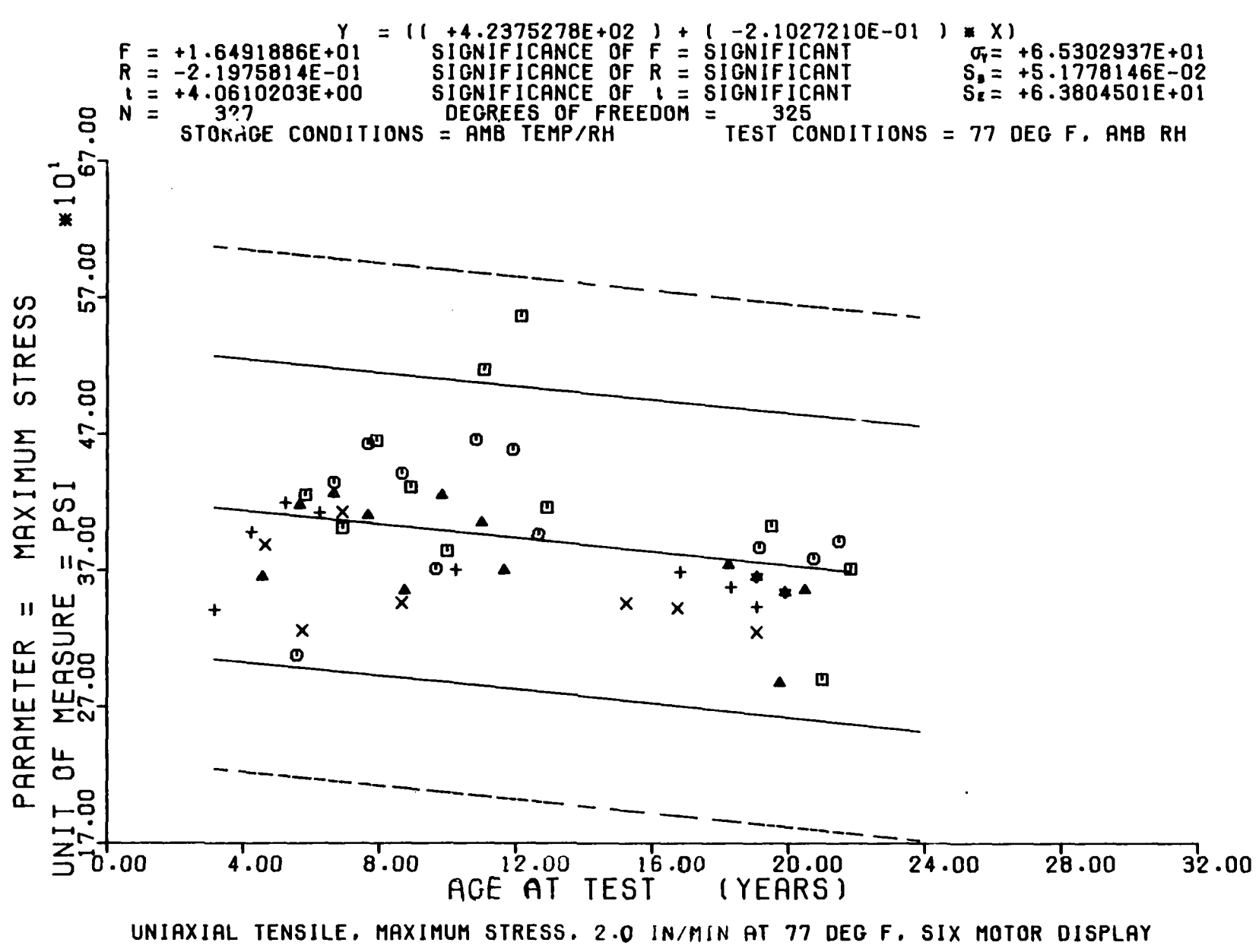

Y = ((+4.2375278E+02) + (-2.1027210E-01) * X)
F = +1.6491886E+01 SIGNIFICANCE OF F = SIGNIFICANT σy= +6.5302937E+01
R = -2.1975814E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb= +5.1778146E-02
t = +4.0610203E+00 SIGNIFICANCE OF t = SIGNIFICANT Se= +6.3804501E+01
N = 327 DEGREES OF FREEDOM = 325
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG F, AMB RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI *10¹
17.00
27.00
37.00
47.00
57.00
67.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, MAXIMUM STRESS, 2.0 IN/MIN AT 77 DEG F, SIX MOTOR DISPLAY

Figure 4-1

from the test program's inception should be available for regressions.

C. A change in testing rails under pressure was made in GTD-30, REV 2, April 1981. This required rails to be tested at 200 in/min under 300 psi pressure. These data are shown as a visual display in figures 4-61 thru 4-65. Strains show a significant increase and there appears to be a significant decrease in modulus.

SECTION IV

TENSILE TESTING

A. Uniaxial JANNAF dogbones were tested at 77°F and 2.0 in/min. The data are show in three sets of figures. Figures 4-1 thru 4-5 represent the visual display of data from six motors. The next set of figures represent averages of data on the individual motors and a third set represent individual data points for each test period.

Figures 4-1 and 4-5 show a significant decrease in maximum stress and stress at rupture. These figures depict a visual display of six motors.

Figures 4-6 thru 4-15 represent motor S/N 0031064. The average values show a non-significant trend in any parameter. The maximum stress shows a significant decrease when individual specimen values are used.

Figures 4-16 thru 4-25 represent motor S/N 0031134. The strain at maximum stress shows a significant increase (figures 4-17 and 4-22).

Figures 4-26 thru 4-35 represent motor S/N 0032434. The maximum stress and stress at rupture show a significant decrease. The modulus for individual points also shows a significant decrease (figure 4-35).

Figures 4-36 thru 4-45 represent motor S/N 0032831. Only strain at rupture (figure 4-38) shows a non-significant trend. With one less time point, the individual data plots show a significant decrease in strain at maximum stress, stress at rupture (figures 4-42 and 4-44) and a significant increase in modulus (figure 4-45).

Figures 4-46 thru 4-55 represent motor S/N 0033174. Only strain at rupture and modulus shows a non-significant trend (figures 4-48 and 4-50).

B. Biaxial rails at low rate, 0.2 in/min, are shown in figures 4-56 thru 4-60. Strains show a significant increase. This data represents the data from the last three test periods. In the next report, data acquired

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
[illegible]	10	+5.1599990E+01	+1.0749967E+00	+5.3000000E+01	+5.0000000E+01	+5.0732162E+01
[illegible]	5	+5.1799987E+01	+8.3666002E-01	+5.3000000E+01	+5.1000000E+01	+5.0518295E+01
[illegible]	5	+5.1799987E+01	+4.4721359E-01	+5.2000000E+01	+5.1000000E+01	+5.0265533E+01
104.0	5	+4.5199990E+01	+1.3038404E+00	+4.5000000E+01	+4.2000000E+01	+4.9837783E+01
153.0	6	+5.0333328E+01	+8.1649658E-01	+5.2000000E+01	+5.0000000E+01	+4.8301803E+01
201.0	5	+4.7599990E+01	+5.4772255E-01	+4.8000000E+01	+4.7000000E+01	+4.7951843E+01

MINUTEMAN II, STAGE III, DISSECTED MTR <00033174>

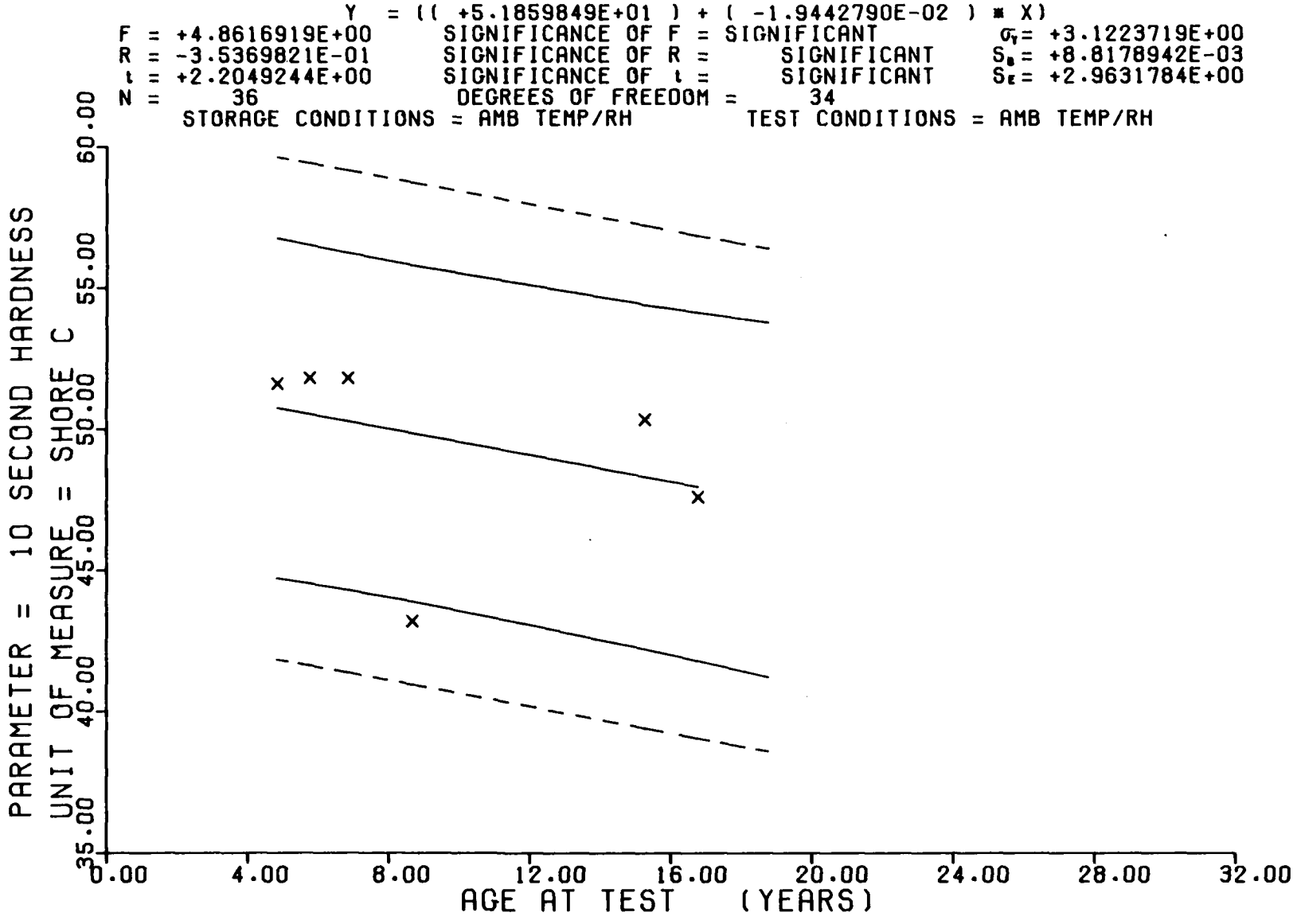

Y = ((+5.1859849E+01) + (-1.9442790E-02) * X)
F = +4.8616919E+00 SIGNIFICANCE OF F = SIGNIFICANT σY = +3.1223719E+00
R = -3.5369821E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +8.8178942E-03
t = +2.2049244E+00 SIGNIFICANCE OF t = SIGNIFICANT Sε = +2.9631784E+00
N = 36 DEGREES OF FREEDOM = 34
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = 10 SECOND HARDNESS
UNIT OF MEASURE = SHORE C
60.00
55.00
50.00
45.00
40.00
35.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
MINUTEMAN II, STAGE III, DISSECTED MTR 0033174, 10 sec HARDNESS , SHORE C

Figure 3-12

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

X OR (LOGTIME)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
30.0	1	+5.1000000E+01	+0.0000000E+07	+5.1000000E+01	+5.1000000E+01	+5.3905181E+01
31.0	1	+4.9199996E+01	+0.0000000E+07	+4.9199996E+01	+4.9199996E+01	+5.3677307E+01
60.0	5	+5.3599990E+01	+3.9442719E-01	+5.8000000E+01	+5.3000000E+01	+5.3414382E+01
78.0	10	+5.4099990E+01	+1.2566839E+00	+5.6000000E+01	+5.2000000E+01	+5.3239105E+01
87.0	5	+5.7000000E+01	+1.0000000E+00	+5.8000000E+01	+5.6000000E+01	+5.3046205E+01
123.0	5	+4.7000000E+01	+1.0000000E+00	+4.8000000E+01	+4.6000000E+01	+5.2415283E+01
200.0	5	+5.0000000E+01	+0.0000000E+07	+5.0000000E+01	+5.0000000E+01	+5.1030563E+01
214.0	5	+5.0000000E+01	+1.8708288E+00	+5.0000000E+01	+5.0000000E+01	+5.0732574E+01

MINUTEMAN II, STAGE III, DISSECTED MTR <0032831>

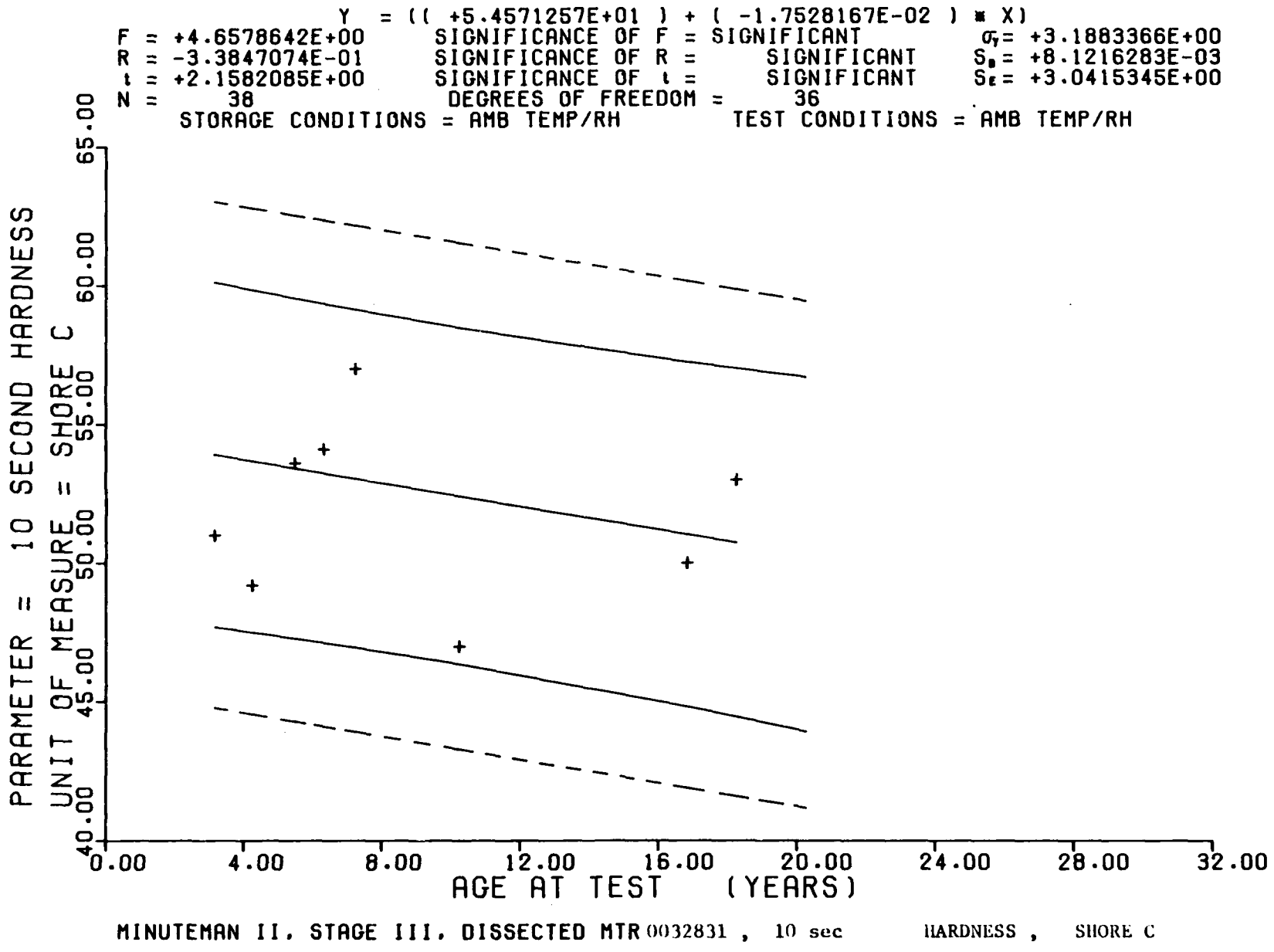

Y = ((+5.4571257E+01) + (-1.7528167E-02) * X)
F = +4.6578642E+00 SIGNIFICANCE OF F = SIGNIFICANT σy= +3.1883366E+00
R = -3.3847074E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb= +8.1216283E-03
t = +2.1582085E+00 SIGNIFICANCE OF t = SIGNIFICANT Se= +3.0415345E+00
N = 38 DEGREES OF FREEDOM = 36
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = 10 SECOND HARDNESS
UNIT OF MEASURE = SHORE C
65.00
60.00
55.00
50.00
45.00
40.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
MINUTEMAN II, STAGE III, DISSECTED MTR 0032831 , 10 sec HARDNESS , SHORE C

Figure 3-11

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
70.0	10	+4.6909952E-01	+6.6136148E-03	+4.7999995E-01	+4.5799994E-01	+4.4910496E-01
83.0	10	+4.4739967E-01	+8.6640446E-03	+4.6199995E-01	+4.3999999E-01	+4.4878977E-01
95.0	10	+4.4729971E-01	+9.3880207E-03	+4.6199995E-01	+4.2999994E-01	+4.4849884E-01
107.0	10	+4.4879966E-01	+9.0731777E-03	+4.6399998E-01	+4.2999994E-01	+4.4820797E-01
120.0	5	+4.4839972E-01	+5.7021084E-03	+4.5399999E-01	+4.3999999E-01	+4.4789278E-01
133.0	3	+4.5799982E-01	+8.0091578E-03	+4.6599996E-01	+4.4999998E-01	+4.4757765E-01
146.0	8	+4.0242469E-01	+1.5406605E-01	+4.6899998E-01	+2.1999999E-02	+4.4726246E-01
155.0	2	+4.5369994E-01	+1.8371599E-03	+4.5499998E-01	+4.5239996E-01	+4.4704431E-01
234.0	6	+4.4319963E-01	+5.5927591E-03	+4.5079994E-01	+4.3829995E-01	+4.4512909E-01
252.0	4	+4.7712469E-01	+2.2210520E-03	+4.7869998E-01	+4.7399997E-01	+4.4469273E-01
262.0	5	+4.4713973E-01	+5.8580023E-03	+4.5469999E-01	+4.4019997E-01	+4.4445031E-01

UNIAXIAL TENSILE, STRAIN AT MAX, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031064.

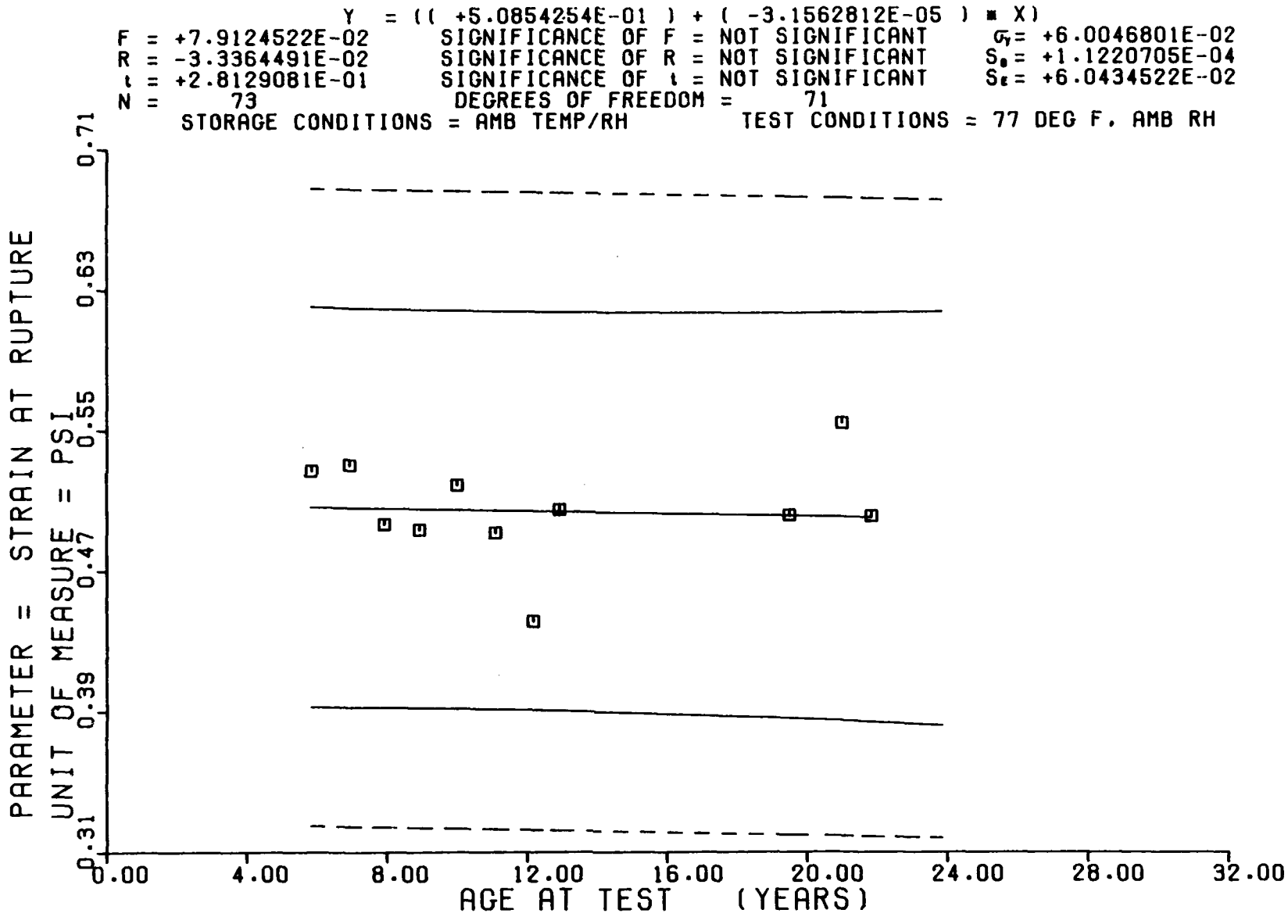

Y = ((+5.0854254E-01) + (-3.1562812E-05) ■ X)
F = +7.9124522E-02 SIGNIFICANCE OF F = NOT SIGNIFICANT
R = -3.3364491E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT
t = +2.8129081E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT
N = 73 DEGREES OF FREEDOM = 71
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG F, AMB RH
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = PSI
0.71
0.63
0.55
0.47
0.39
0.31
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, STRAIN AT RUP, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031064.

Figure 4-8

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
70.0	10	+5.2699953E-01	+8.2680051E-03	+5.3899997E-01	+5.1699995E-01	+5.0633311E-01
83.0	10	+5.3039968E-01	+7.8170340E-03	+5.4199999E-01	+5.1599997E-01	+5.0592279E-01
95.0	10	+4.9649953E-01	+1.7798327E-02	+5.1999998E-01	+4.5999997E-01	+5.0554406E-01
107.0	10	+4.9349951E-01	+8.0655454E-03	+5.1099997E-01	+4.7999995E-01	+5.0516527E-01
120.0	5	+5.1899963E-01	+1.4716522E-02	+5.3999996E-01	+5.0099998E-01	+5.0475496E-01
133.0	3	+4.9166643E-01	+1.4648017E-02	+5.0499999E-01	+4.7599995E-01	+5.0434464E-01
146.0	8	+4.4144952E-01	+1.6671396E-01	+5.2499997E-01	+3.0999999E-02	+5.0393432E-01
155.0	2	+5.0489997E-01	+8.2045966E-03	+5.1069998E-01	+4.9909996E-01	+5.0365030E-01
234.0	6	+5.0159960E-01	+1.2672013E-02	+5.2109998E-01	+4.8769998E-01	+5.0115680E-01
252.0	4	+5.5374956E-01	+7.0328638E-03	+5.6199997E-01	+5.4519999E-01	+5.0058871E-01
262.0	5	+5.0117945E-01	+1.8494879E-02	+5.2499997E-01	+4.8459994E-01	+5.0027304E-01

UNIAXIAL TENSILE, STRAIN AT RUP, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031064.

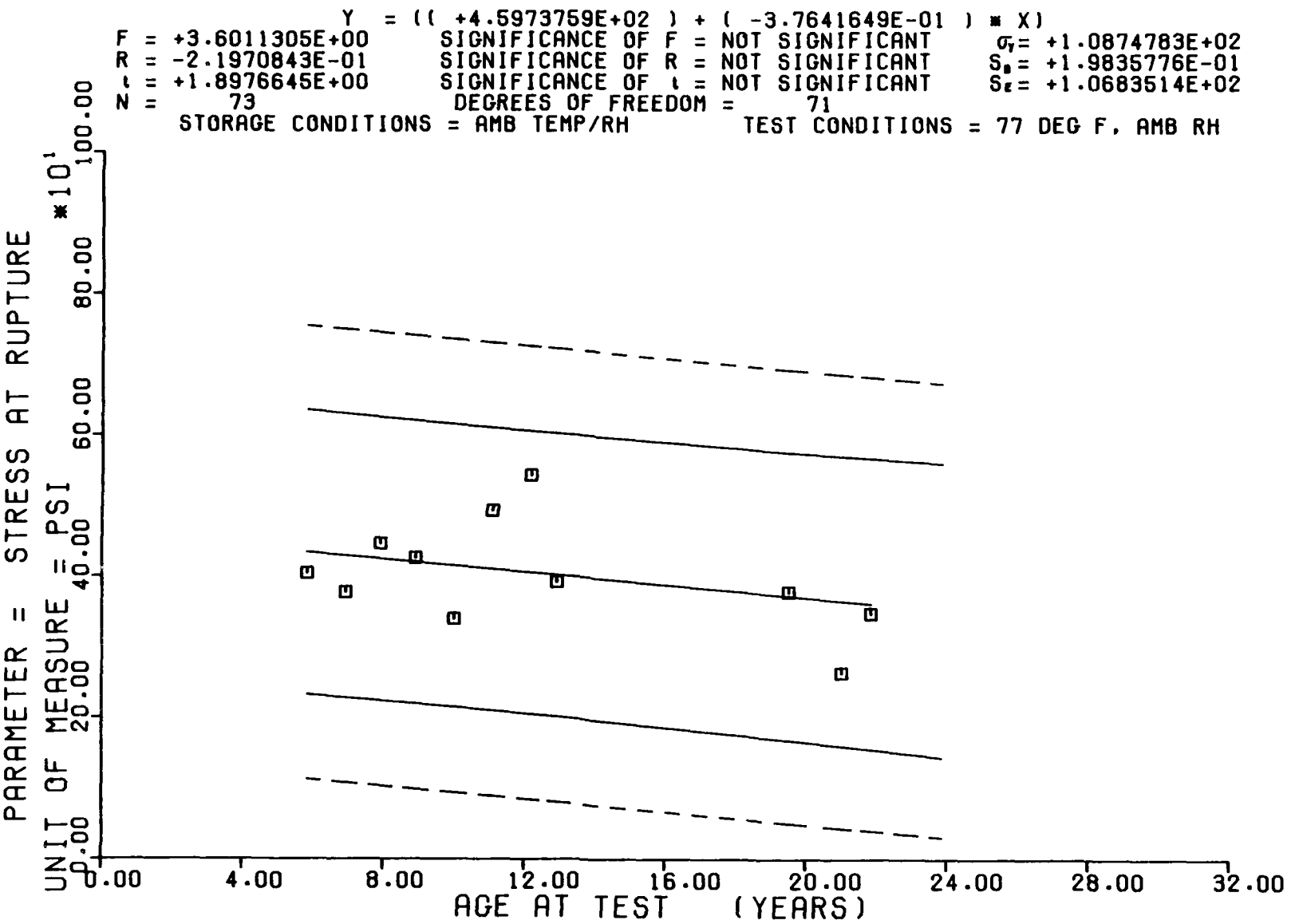

Y = ((+4.5973759E+02) + (-3.7641649E-01) * X)
F = +3.6011305E+00 SIGNIFICANCE OF F = NOT SIGNIFICANT σy= +1.0874783E+02
R = -2.1970843E-01 SIGNIFICANCE OF R = NOT SIGNIFICANT Sb= +1.9835776E-01
t = +1.8976645E+00 SIGNIFICANCE OF t = NOT SIGNIFICANT Se= +1.0683514E+02
N = 73 DEGREES OF FREEDOM = 71
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG F, AMB RH
PARAMETER = STRESS AT RUPTURE
UNIT OF MEASURE = PSI *10¹
100.00
80.00
60.00
40.00
20.00
0.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, STRESS AT RUP, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031064.

Figure 4-9

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (HOURS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
70.0	10	+4.0419995E+02	+1.0443498E+01	+4.1700000E+02	+3.9200000E+02	+4.[illegible]042E+02
[illegible].0	10	+3.7089990E+02	+1.2324870E+01	+3.9200000E+02	+3.5000000E+02	+4.2849487E+02
[illegible].0	10	+4.4600000E+02	+9.6669178E+00	+4.6000000E+02	+4.3000000E+02	+4.2397802E+02
107.0	10	+4.2559985E+02	+2.5329437E+01	+4.9000000E+02	+4.0300000E+02	+4.1946093E+02
120.0	5	+3.9659991E+02	+1.1855823E+01	+3.5200000E+02	+3.2000000E+02	+4.1456738E+02
143.0	3	+4.9266650E+02	+1.7925772E+01	+5.0400000E+02	+4.7200000E+02	+4.0967407E+02
146.0	8	+5.4293457E+02	+2.7117295E+02	+1.2130000E+03	+4.2662988E+02	+4.0478076E+02
155.0	2	+3.9172973E+02	+3.7117053E+00	+3.9575976E+02	+3.8769995E+02	+4.0139232E+02
234.0	6	+3.7807812E+02	+1.0121482E+01	+3.9221997E+02	+3.6432983E+02	+3.7165600E+02
[illegible].0	4	+2.0370483E+02	+4.3171507E+00	+2.0795994E+02	+2.0911987E+02	+3.6488061E+02
[illegible].0	5	+3.4732565E+02	+1.4013345E+01	+3.6450976E+02	+3.2989990E+02	+3.6111645E+02

UNIAXIAL TENSILE, STRESS AT RUP, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031064.

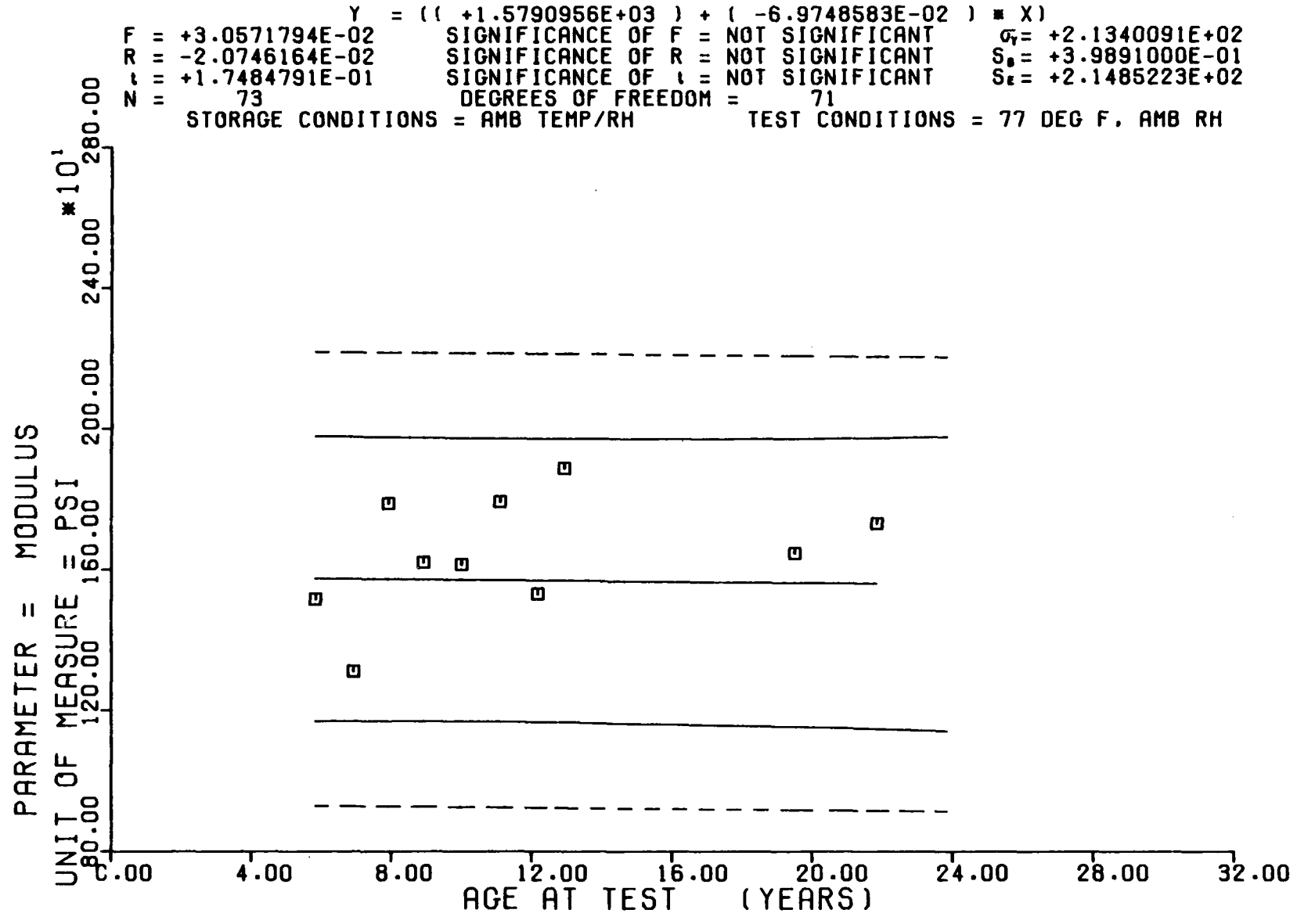

Y = ((+1.5790956E+03) + (-6.9748583E-02) * X)
F = +3.0571794E-02 SIGNIFICANCE OF F = NOT SIGNIFICANT σY= +2.1340091E+02
R = -2.0746164E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT Sβ= +3.9891000E-01
t = +1.7484791E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT Sε= +2.1485223E+02
N = 73 DEGREES OF FREEDOM = 71
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG F, AMB RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI *10¹
280.00
240.00
200.00
160.00
120.00
80.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, MODULUS, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031064.

Figure 4-10

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
70.0	10	+1.5165000E+03	+6.0491964E+01	+1.6050000E+03	+1.4140000E+03	+1.5742131E+03
83.0	10	+1.3110000E+03	+3.3476359E+01	+1.3900000E+03	+1.2700000E+03	+1.5733063E+03
95.0	10	+1.7880000E+03	+7.2541176E+01	+1.8800000E+03	+1.6800000E+03	+1.5724694E+03
107.0	10	+1.6205000E+03	+8.4929709E+01	+1.7300000E+03	+1.4500000E+03	+1.5716323E+03
120.0	5	+1.6143999E+03	+5.8624227E+01	+1.6720000E+03	+1.5200000E+03	+1.5707255E+03
135.0	3	+1.7933332E+03	+9.8657657E+01	+1.8600000E+03	+1.6800000E+03	+1.5698188E+03
146.0	8	+1.5312500E+03	+1.6699508E+02	+1.6840000E+03	+1.1760000E+03	+1.5689121E+03
155.0	2	+1.8875000E+03	+1.9445436E+02	+2.0250000E+03	+1.7500000E+03	+1.5682844E+03
234.0	6	+1.6463332E+03	+5.9948867E+01	+1.7510000E+03	+1.5740000E+03	+1.5627744E+03
252.0	4	+1.0552500E+03	+3.1573987E+01	+1.0900000E+03	+1.0280000E+03	+1.5615187E+03
262.0	5	+1.7315998E+03	+9.7022162E+01	+1.8890000E+03	+1.6560000E+03	+1.5608212E+03

UNIAXIAL TENSILE, MODULUS, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031064.

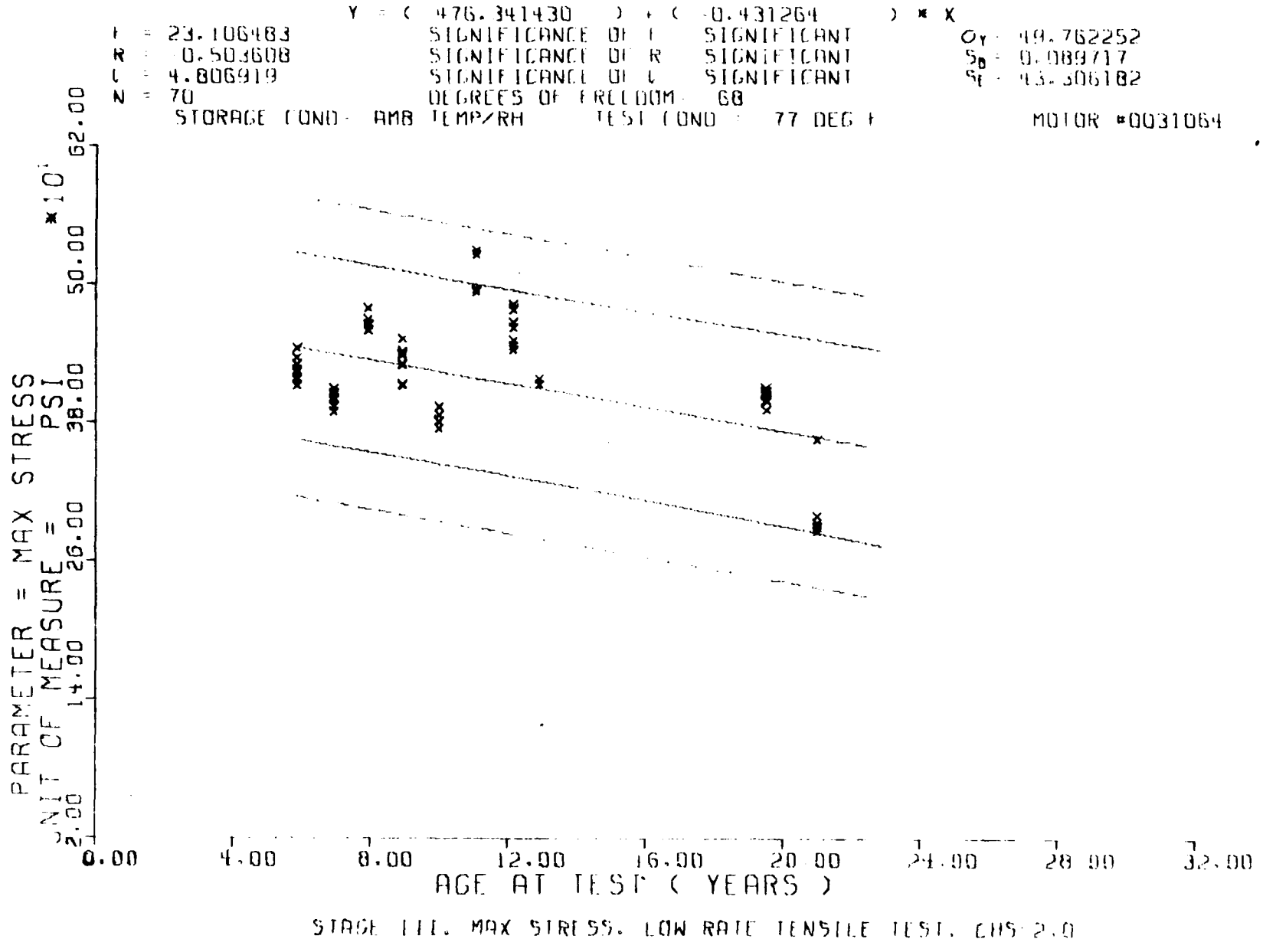

Y = (476.341430) + (-0.431264) * X
I = 23.106483 SIGNIFICANCE OF I SIGNIFICANT
R = 0.503608 SIGNIFICANCE OF R SIGNIFICANT
L = 4.806919 SIGNIFICANCE OF L SIGNIFICANT
N = 70 DEGREES OF FREEDOM = 68
σ_Y = 49.762252
S_B = 0.089717
S_E = 43.306182
STORAGE COND = AMB TEMP/RH TEST COND = 77 DEG F MOTOR #0031064
PARAMETER = MAX STRESS
UNIT OF MEASURE = PSI
*10
62.00
50.00
38.00
26.00
14.00
2.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
STAGE III, MAX STRESS, LOW RATE TENSILE TEST, CHS 2.0

Figure 4-11

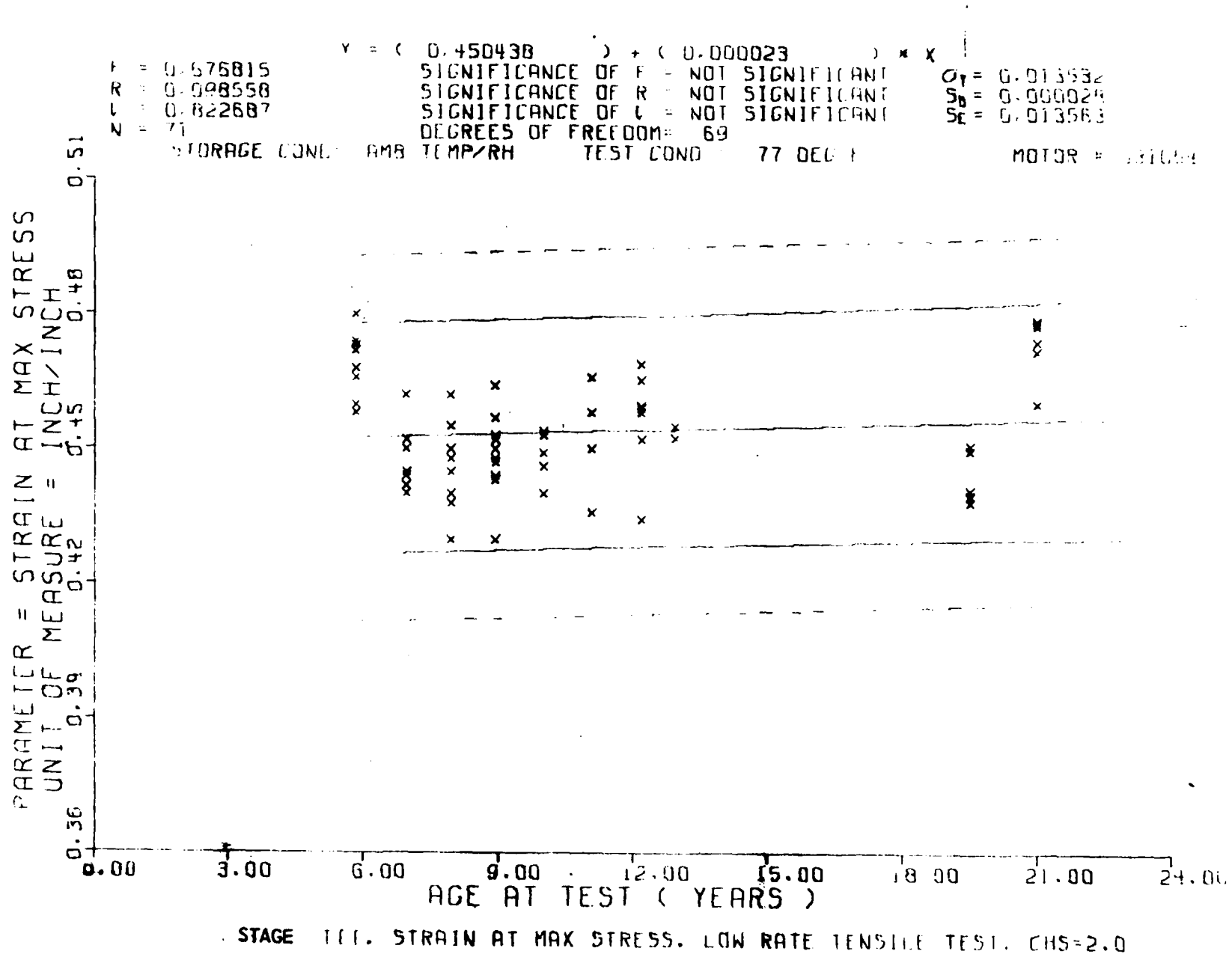

Y = (0.450438) + (0.000023) * X
F = 0.576815
R = 0.098558
t = 0.822687
N = 71
SIGNIFICANCE OF F = NOT SIGNIFICANT
SIGNIFICANCE OF R = NOT SIGNIFICANT
SIGNIFICANCE OF t = NOT SIGNIFICANT
DEGREES OF FREEDOM= 69
STORAGE COND AMB TEMP/RH TEST COND 77 DEG F
MOTOR =
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = INCH/INCH
0.51
0.48
0.45
0.42
0.39
0.36
0.00
3.00
6.00
9.00
12.00
15.00
18.00
21.00
24.00
AGE AT TEST (YEARS)
STAGE III. STRAIN AT MAX STRESS. LOW RATE TENSILE TEST. CHS=2.0

Figure 4-12

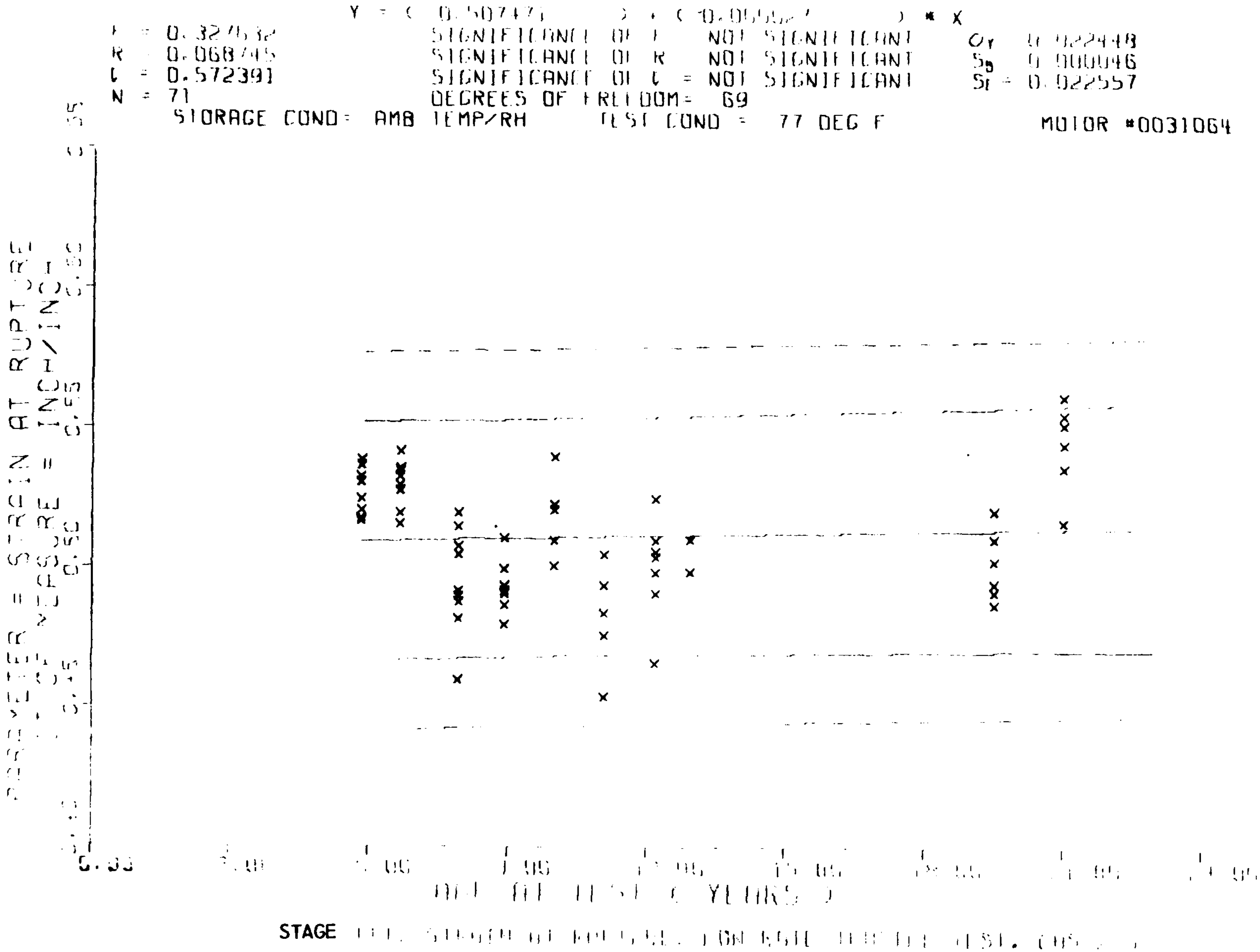

Y = (
F = 0.327632
R = 0.068745
C = 0.572391
N = 71
SIGNIFICANCE OF F NOT SIGNIFICANT
SIGNIFICANCE OF R NOT SIGNIFICANT
SIGNIFICANCE OF C = NOT SIGNIFICANT
DEGREES OF FREEDOM= 69
STORAGE COND= AMB TEMP/RH
TEST COND = 77 DEG F
MOTOR #0031064

Figure 4-13

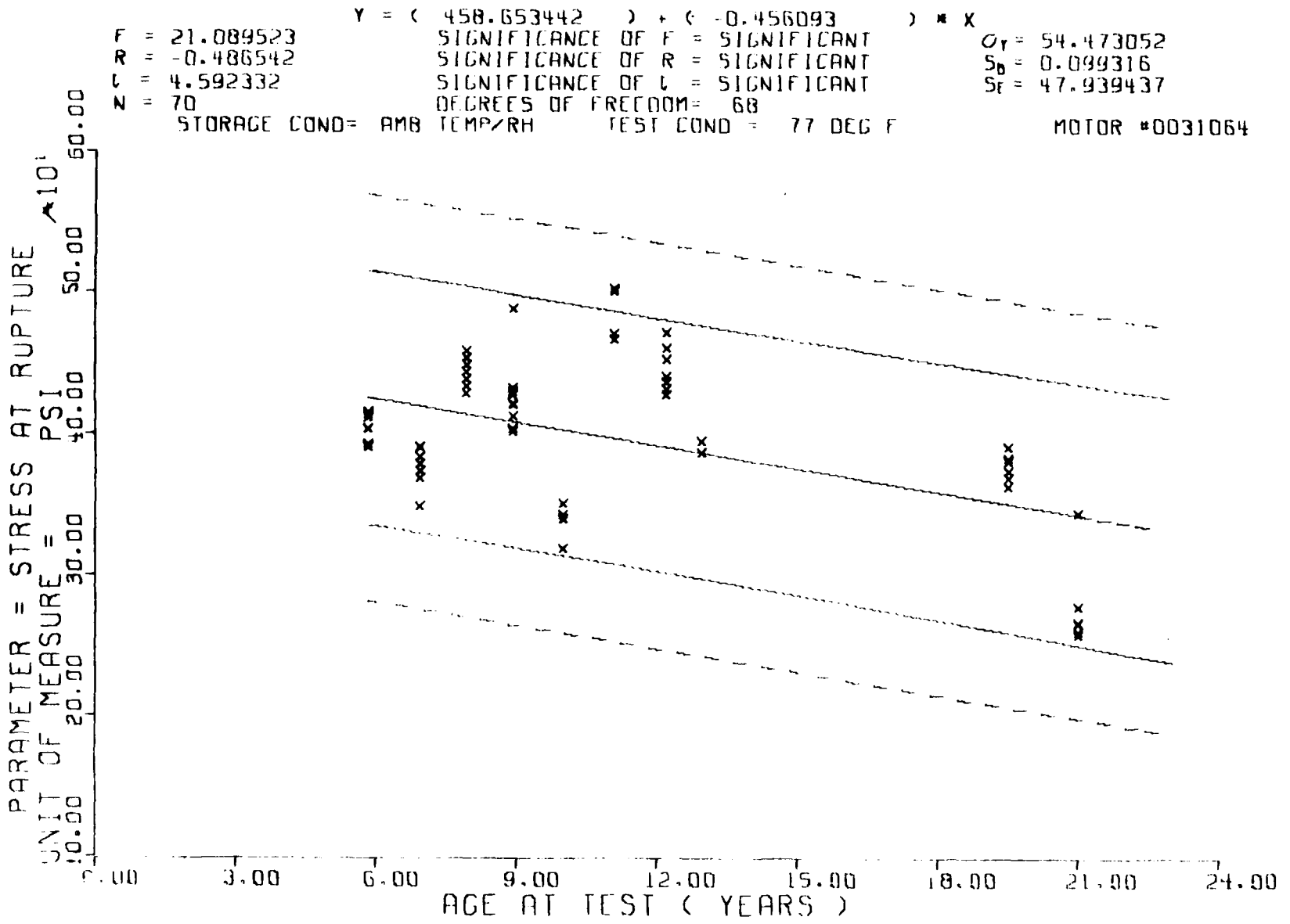

Y = (458.653442) + (-0.456093) * X
F = 21.089523
R = -0.486542
t = 4.592332
N = 70
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM= 68
σ_Y = 54.473052
S_b = 0.099316
S_E = 47.939437
STORAGE COND= AMB TEMP/RH
TEST COND = 77 DEG F
MOTOR #0031064
PARAMETER = STRESS AT RUPTURE
UNIT OF MEASURE = PSI *10^1
60.00
50.00
40.00
30.00
20.00
10.00
0.00
3.00
6.00
9.00
12.00
15.00
18.00
21.00
24.00
AGE AT TEST (YEARS)
STAGE III. STRESS AT RUPTURE. LOW RATE TENSILE TEST. CHS-2.0

Figure 4-14

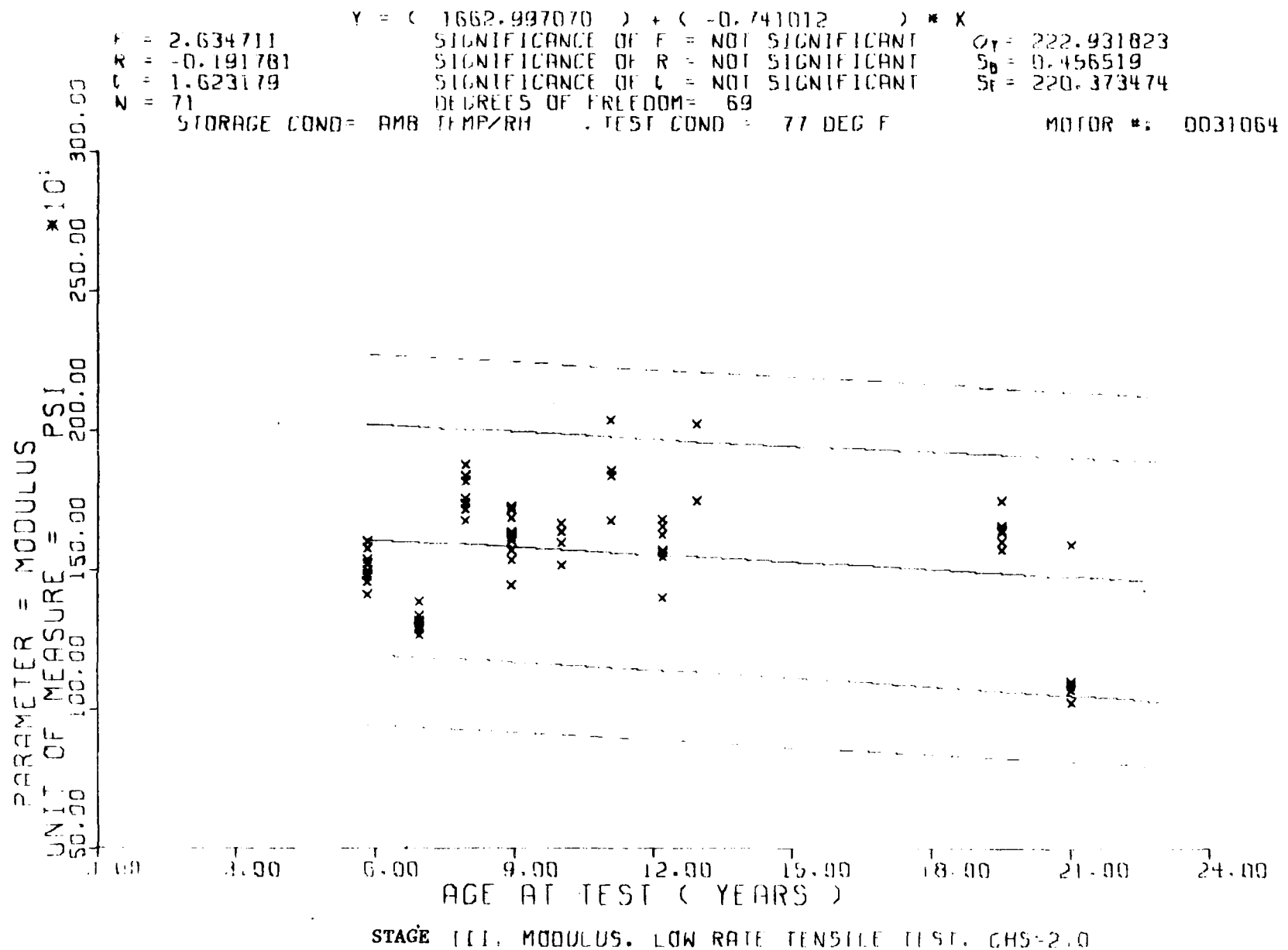

Y = (1662.997070) + (-0.741012) * X
F = 2.634711 SIGNIFICANCE OF F = NOT SIGNIFICANT
R = -0.191781 SIGNIFICANCE OF R = NOT SIGNIFICANT
t = 1.623179 SIGNIFICANCE OF t = NOT SIGNIFICANT
N = 71 DEGREES OF FREEDOM= 69
σ_T = 222.931823
S_D = 0.456519
S_E = 220.373474
STORAGE COND= AMB TEMP/RH . TEST COND = 77 DEG F
MOTOR #: 0031064
PARAMETER = MODULUS *10
UNIT OF MEASURE = PSI
300.00
250.00
200.00
150.00
100.00
50.00
3.00
6.00
9.00
12.00
15.00
18.00
21.00
24.00
AGE AT TEST (YEARS)
STAGE III, MODULUS, LOW RATE TENSILE TEST, CHS-2.0

Figure 4-15

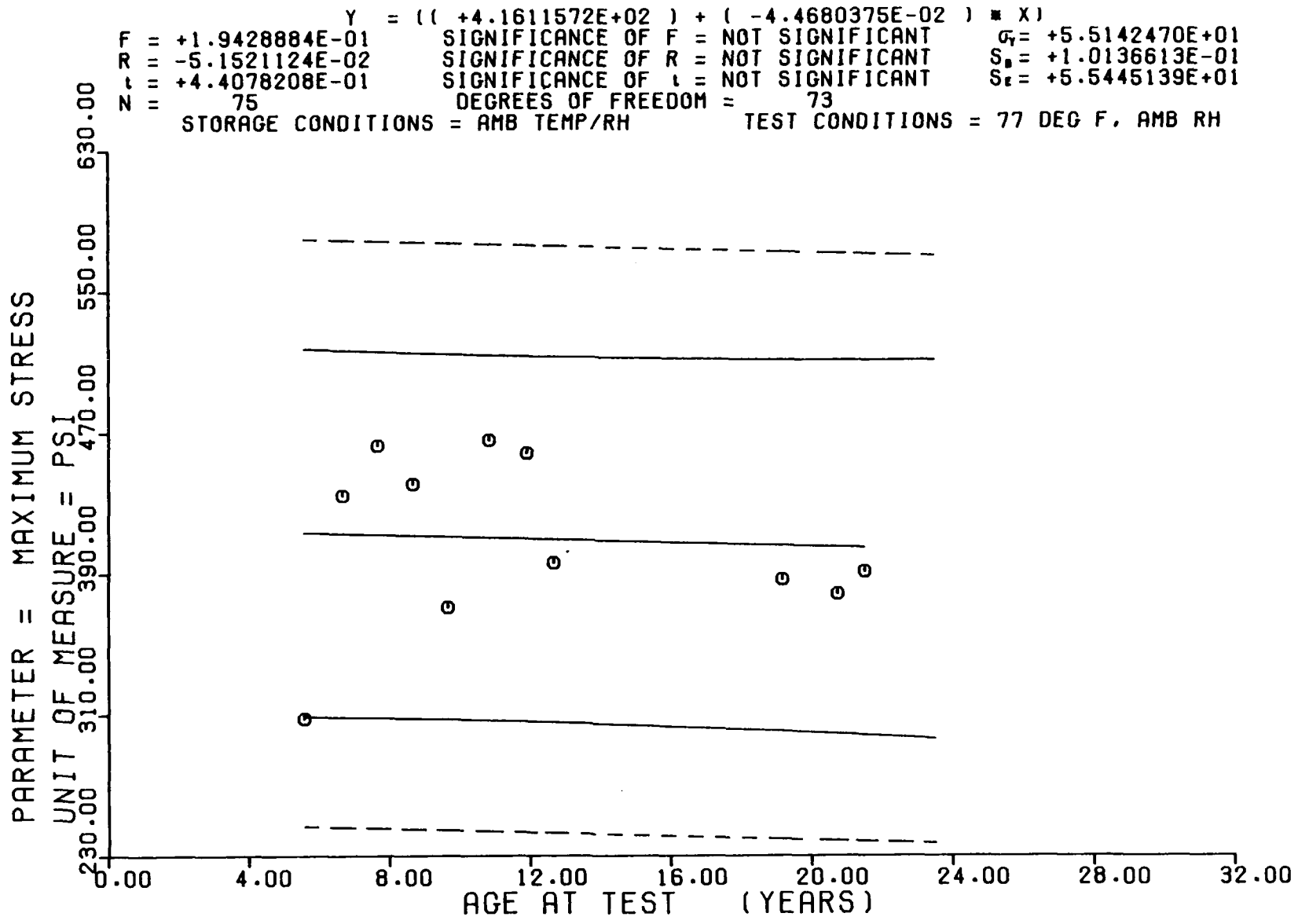

Y = ((+4.1611572E+02) + (-4.4680375E-02) * X)
F = +1.9428884E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT
R = -5.1521124E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT
t = +4.4078208E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT
N = 75 DEGREES OF FREEDOM = 73
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG F, AMB RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI
630.00
550.00
470.00
390.00
310.00
230.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, MAXIMUM STRESS, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031134.

Figure 4-16

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
67.0	10	+3.0769995E+02	+1.5434809E+01	+3.3000000E+02	+2.8700000E+02	+4.1312207E+02
80.0	9	+4.3433325E+02	+1.8881207E+01	+4.6000000E+02	+4.1500000E+02	+4.1254125E+02
92.0	10	+4.6250000E+02	+5.8925565E+00	+4.7500000E+02	+4.5500000E+02	+4.1200488E+02
104.0	10	+4.4089990E+02	+2.8602447E+01	+4.7300000E+02	+4.0000000E+02	+4.1146875E+02
116.0	5	+3.7087988E+02	+9.1243210E+00	+3.8319995E+02	+3.6000000E+02	+4.1093261E+02
130.0	5	+4.6559985E+02	+7.7974354E+00	+4.7200000E+02	+4.5200000E+02	+4.1030712E+02
143.0	7	+4.5821118E+02	+4.8467680E+01	+5.2289990E+02	+4.0447998E+02	+4.0972631E+02
152.0	3	+3.9598315E+02	+4.7279058E+00	+3.9975000E+02	+3.9068994E+02	+4.0932421E+02
230.0	6	+3.8656152E+02	+5.6911173E+00	+3.9211987E+02	+3.7658984E+02	+4.0583911E+02
249.0	5	+3.7834375E+02	+7.5887701E+00	+3.8920996E+02	+3.6993994E+02	+4.0499023E+02
258.0	5	+3.9101977E+02	+4.0537609E+00	+3.9761987E+02	+3.8692993E+02	+4.0458813E+02

UNIAXIAL TENSILE, MAXIMUM STRESS, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031134.

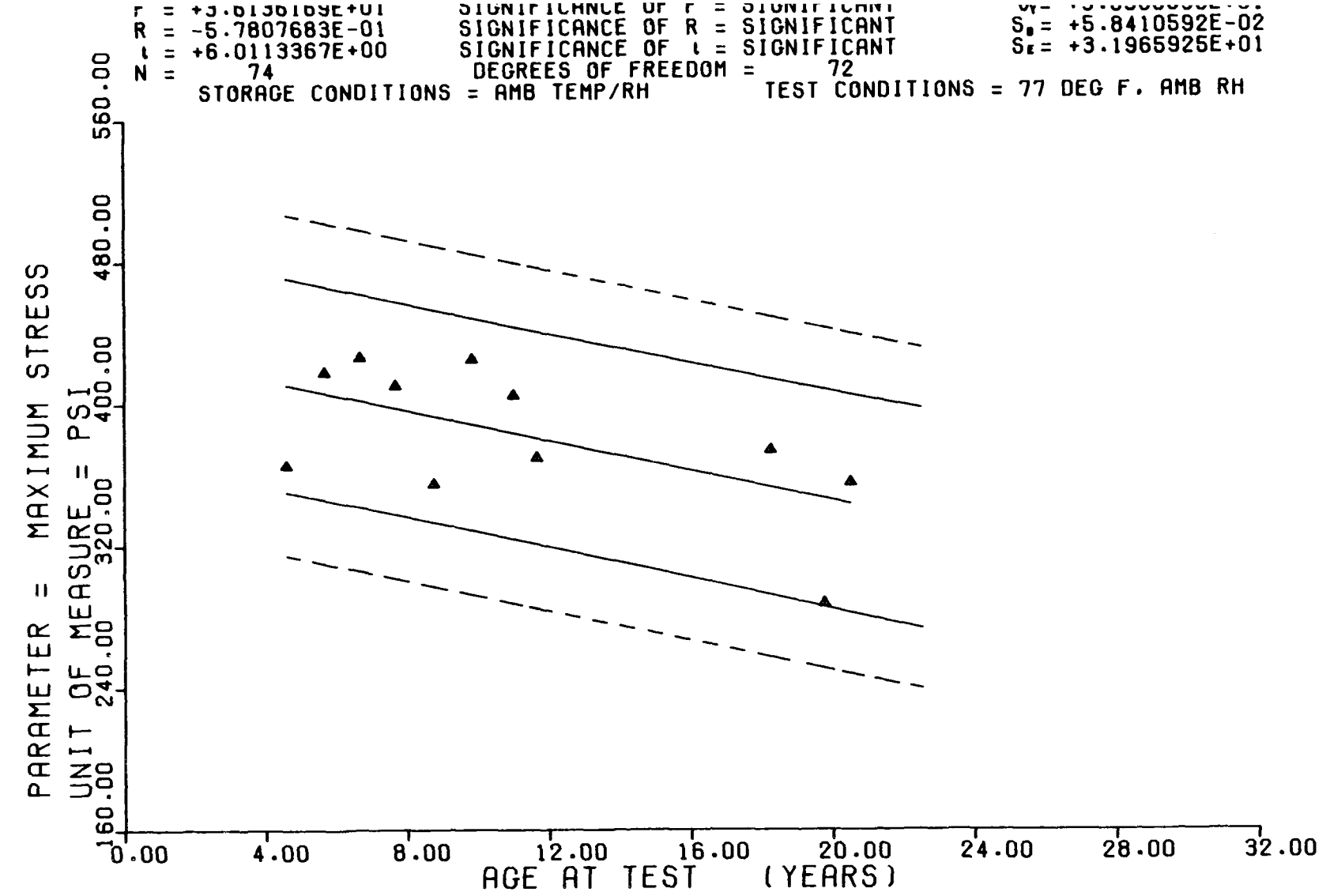
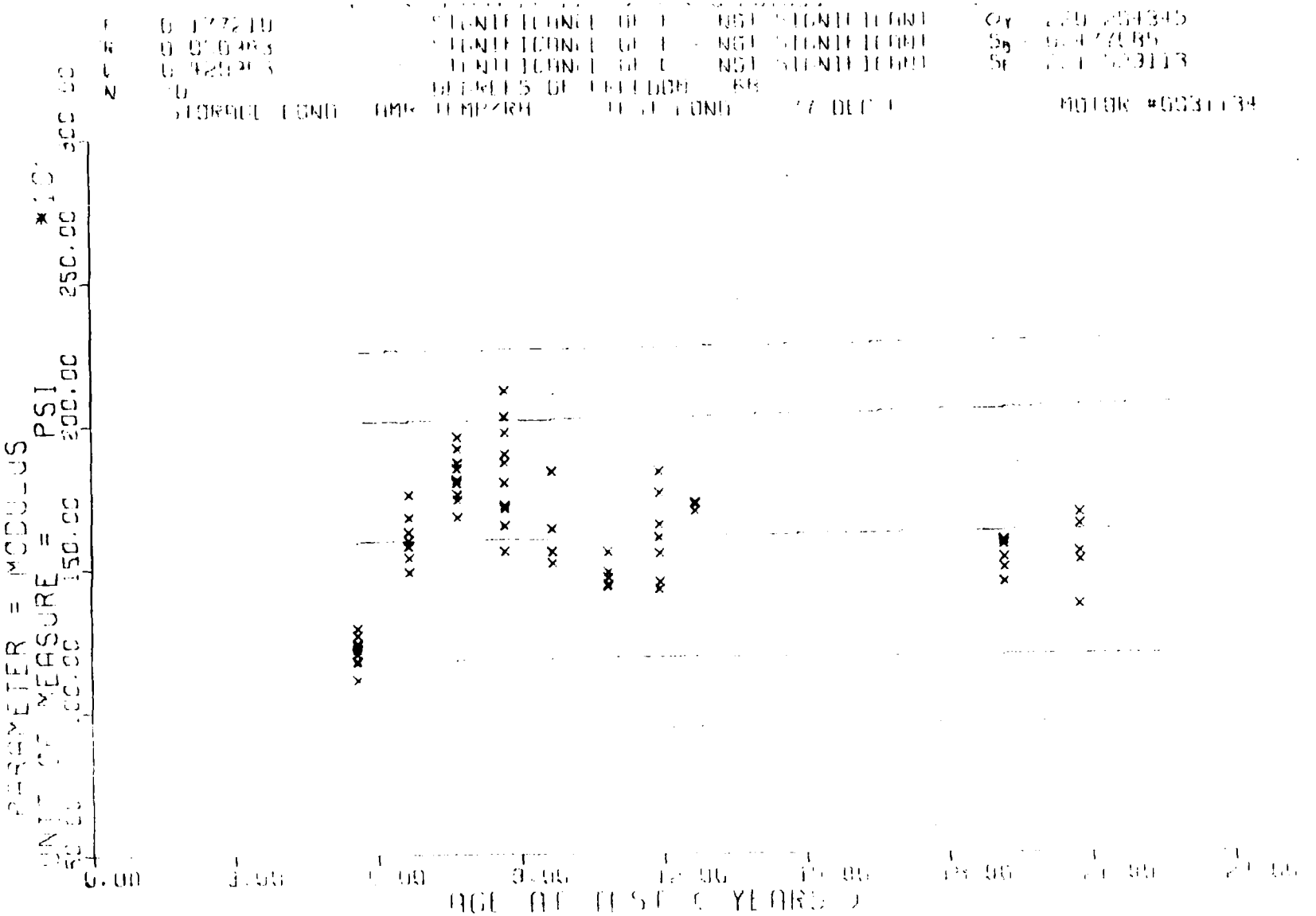
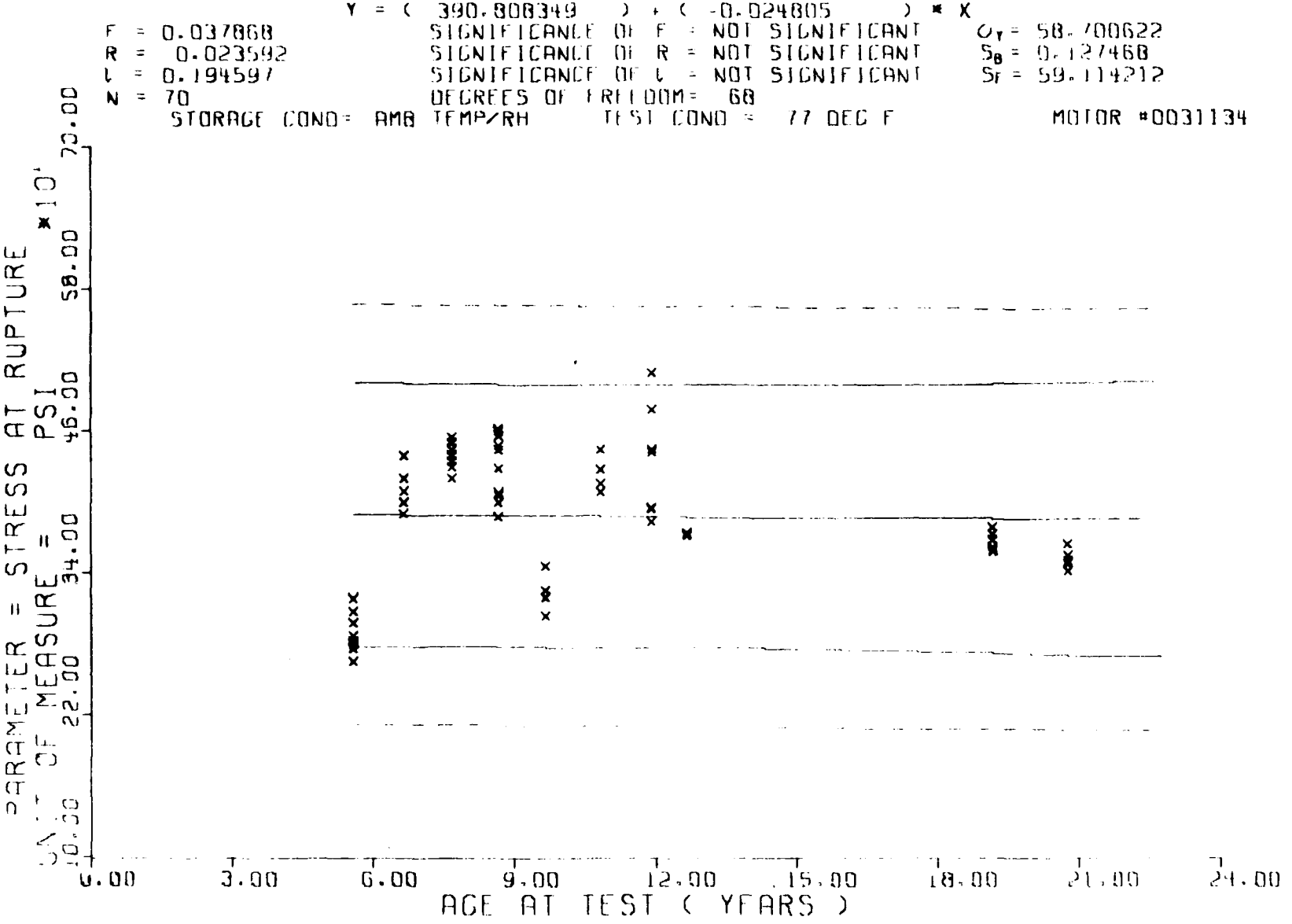

F = +3.6136169E+01
SIGNIFICANCE OF F = SIGNIFICANT
R = -5.7807683E-01
SIGNIFICANCE OF R = SIGNIFICANT
S$_e$ = +5.8410592E-02
t = +6.0113367E+00
SIGNIFICANCE OF t = SIGNIFICANT
S$_E$ = +3.1965925E+01
N = 74
DEGREES OF FREEDOM = 72
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = 77 DEG F. AMB RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI
560.00
480.00
400.00
320.00
240.00
160.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, MAXIMUM STRESS, 2.0 IN/MIN AT 77 DEG F. MOTOR=0032434.

Figure 4-26



STAGE

Figure 4-25



STAGE III, STRESS AT RUPTURE, LOW RATE TENSILE TEST, CHS=2.0

Figure 4-24

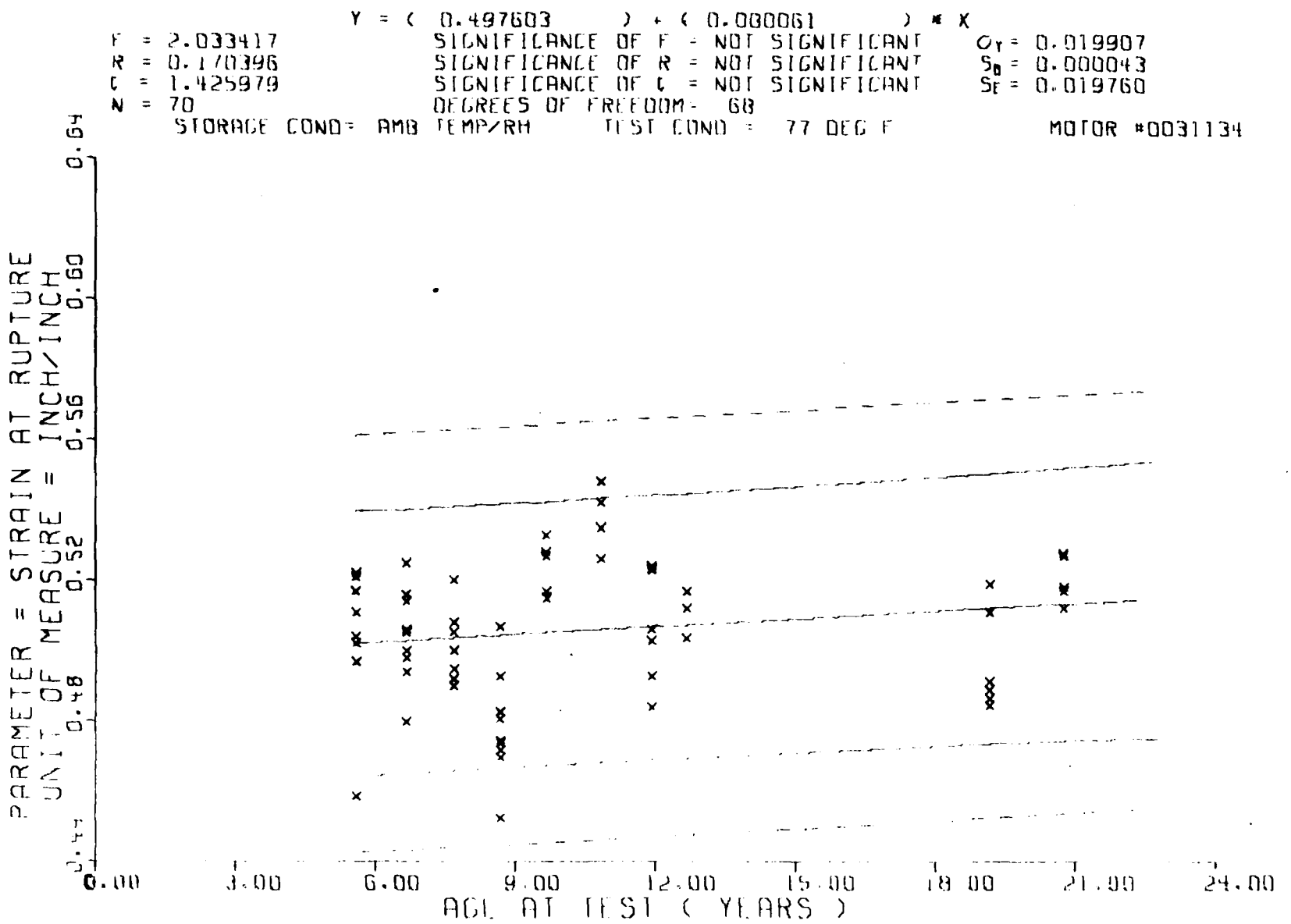

Y = (0.497603) + (0.000061) * X
F = 2.033417
R = 0.170396
C = 1.425979
N = 70
SIGNIFICANCE OF F = NOT SIGNIFICANT
SIGNIFICANCE OF R = NOT SIGNIFICANT
SIGNIFICANCE OF C = NOT SIGNIFICANT
DEGREES OF FREEDOM= 68
σ_Y = 0.019907
S_B = 0.000043
S_E = 0.019760
STORAGE COND= AMB TEMP/RH
TEST COND = 77 DEG F
MOTOR #0031134
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = INCH/INCH
0.64
0.60
0.56
0.52
0.48
0.00
3.00
6.00
9.00
12.00
15.00
18.00
21.00
24.00
AGE AT TEST (YEARS)
STAGE III. STRAIN AT RUPTURE. LOW RATE TENSILE TEST. CHS-2.0

Figure 4-23

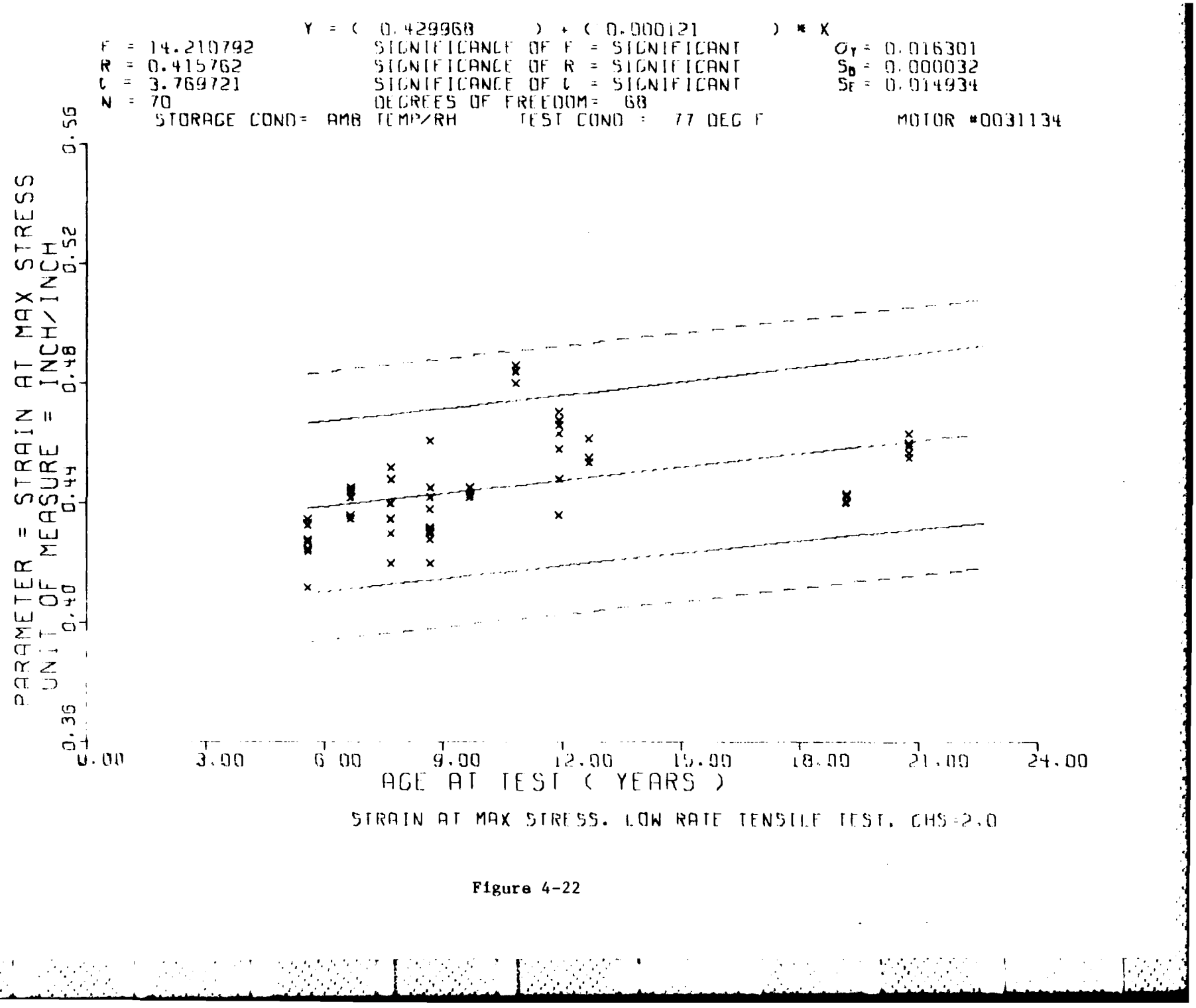

Y = (0.429968) + (0.000121) * X
F = 14.210792
R = 0.415762
t = 3.769721
N = 70
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM= 68
σ_Y = 0.016301
S_b = 0.000032
S_E = 0.014934
STORAGE COND= AMB TEMP/RH
TEST COND = 77 DEG F
MOTOR #0031134
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = INCH/INCH
0.56
0.52
0.48
0.44
0.40
0.36
0.00
3.00
6.00
9.00
12.00
15.00
18.00
21.00
24.00
AGE AT TEST (YEARS)
STRAIN AT MAX STRESS. LOW RATE TENSILE TEST. CHS=2.0

Figure 4-22

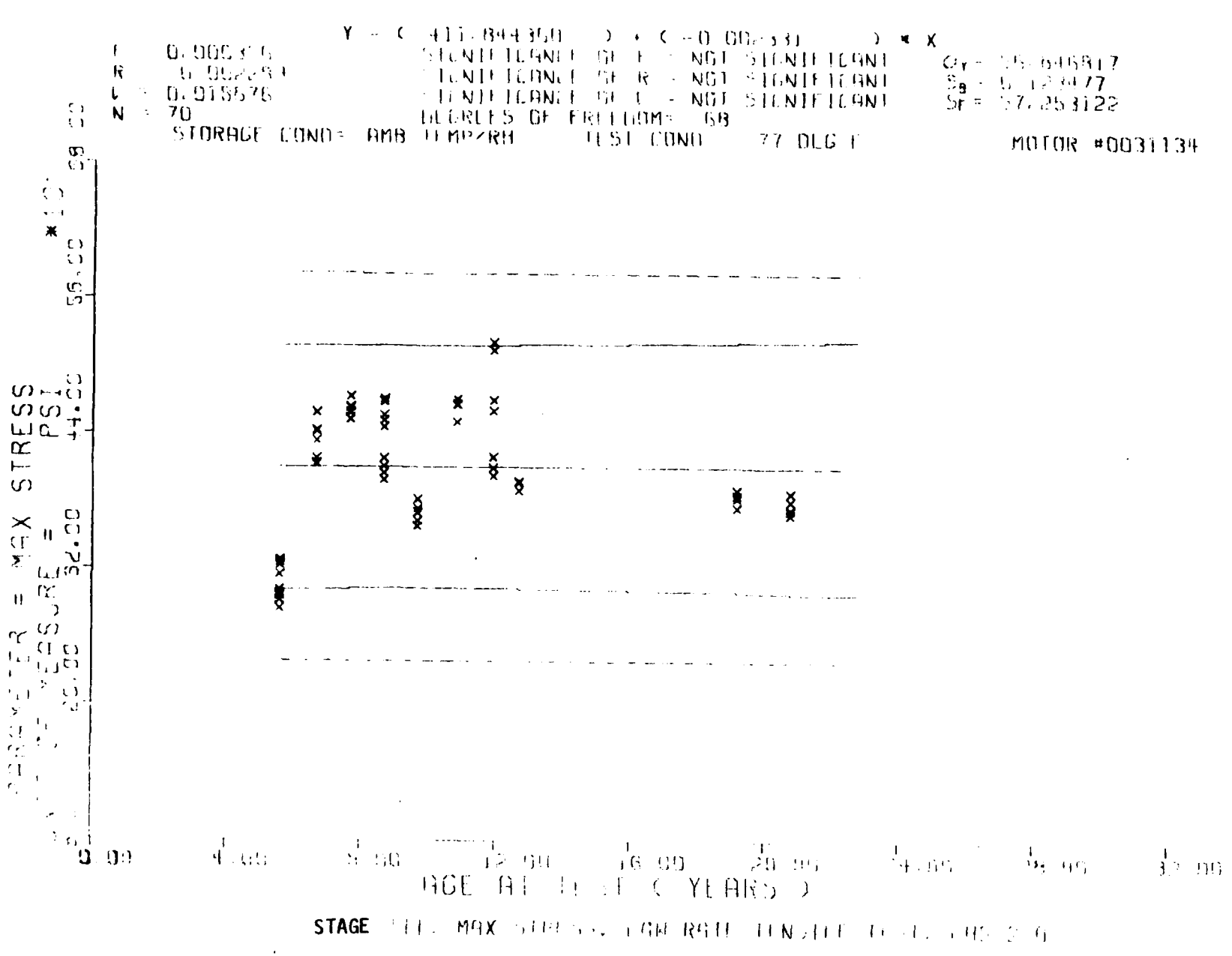

Y = (41.844350) + (-0.00[illegible]) * X
F = 0.900[illegible]
R = 0.[illegible]
L = 0.915676
N = 70
SIGNIFICANCE OF F = NOT SIGNIFICANT
SIGNIFICANCE OF R = NOT SIGNIFICANT
SIGNIFICANCE OF L = NOT SIGNIFICANT
DEGREES OF FREEDOM= 68
STORAGE COND= AMB TEMP/RH
TEST COND 77 DEG F
MOTOR #0031134
55.00
44.00
33.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)

Figure 4-21

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
67.0	10	+1.2180000E+03	+5.1415518E+01	+1.2960000E+03	+1.1170000E+03	+1.6084995E+03
80.0	9	+1.6044443E+03	+7.8751366E+01	+1.7600000E+03	+1.4900000E+03	+1.6044455E+03
92.0	10	+1.8190000E+03	+8.3982802E+01	+1.9600000E+03	+1.6800000E+03	+1.6007033E+03
104.0	10	+1.8335000E+03	+1.7769683E+02	+2.1200000E+03	+1.5600000E+03	+1.5969611E+03
116.0	5	+1.6240000E+03	+1.2837445E+02	+1.8400000E+03	+1.5200000E+03	+1.5932189E+03
130.0	5	+1.4815998E+03	+4.8236915E+01	+1.5600000E+03	+1.4400000E+03	+1.5888530E+03
143.0	7	+1.6155712E+03	+1.5194665E+02	+1.8380000E+03	+1.4280000E+03	+1.5847990E+03
152.0	3	+1.7193332E+03	+1.5947831E+01	+1.7300000E+03	+1.7010000E+03	+1.5819924E+03
230.0	6	+1.5415000E+03	+5.8776696E+01	+1.5950000E+03	+1.4490000E+03	+1.5576682E+03
249.0	5	+1.5577998E+03	+1.2503079E+02	+1.6900000E+03	+1.3700000E+03	+1.5517431E+03
258.0	5	+1.3845998E+03	+3.1141612E+01	+1.4340000E+03	+1.3540000E+03	+1.5489365E+03

UNIAXIAL TENSILE, MODULUS, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031134.

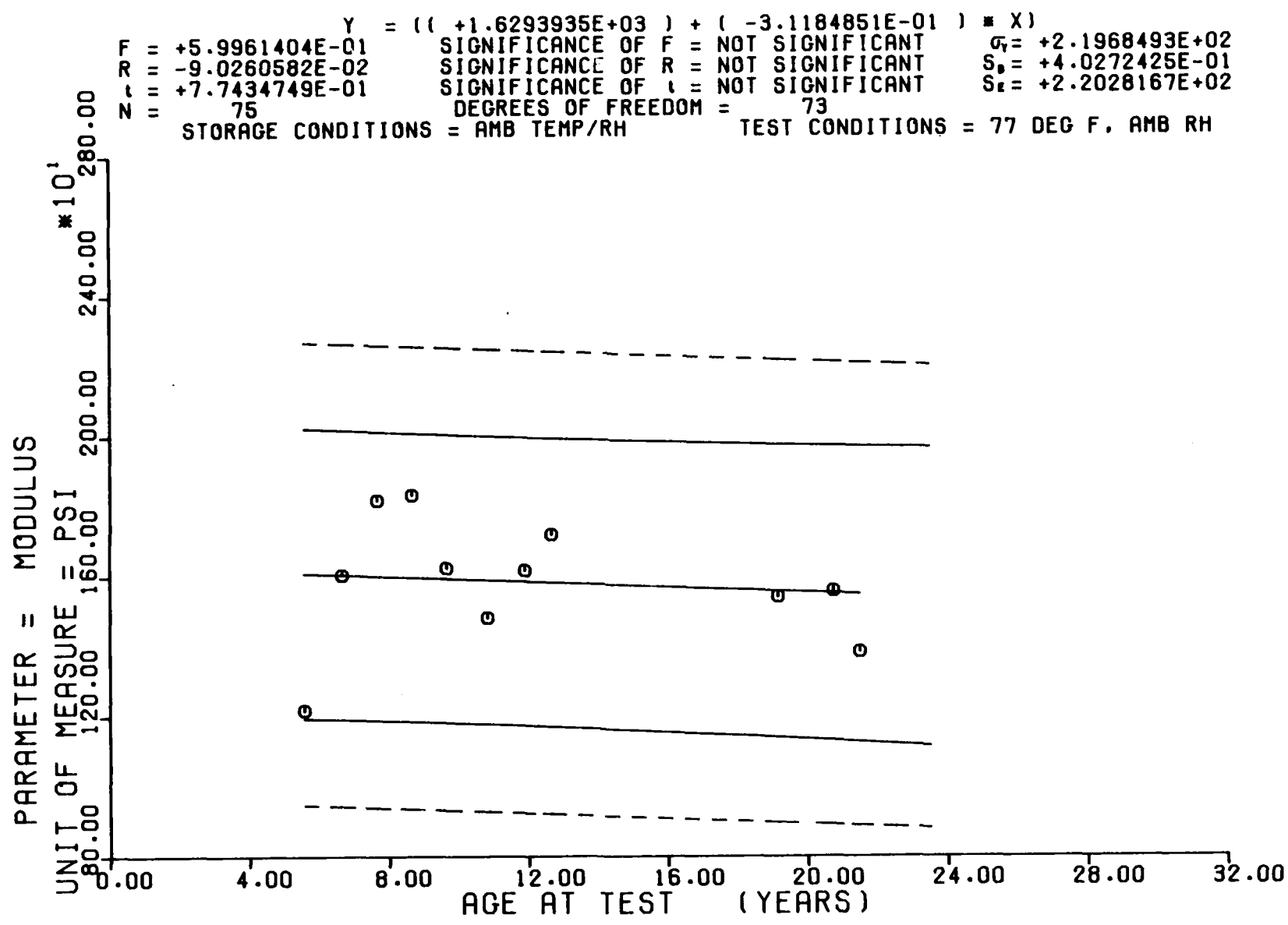

Y = ((+1.6293935E+03) + (-3.1184851E-01) * X)
F = +5.9961404E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT σY = +2.1968493E+02
R = -9.0260582E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT Sb = +4.0272425E-01
t = +7.7434749E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT Se = +2.2028167E+02
N = 75 DEGREES OF FREEDOM = 73
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG F, AMB RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI *10¹
280.00
240.00
200.00
160.00
120.00
80.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, MODULUS, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031134.

Figure 4-20

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
17.0	10	+2.9600000E+02	+1.7422845E+01	+3.1900000E+02	+2.6600000E+02	+3.9042700E+02
50.0	9	+4.1333325E+02	+1.8027756E+01	+4.4000000E+02	+3.9000000E+02	+3.8961279E+02
82.0	10	+4.4050000E+02	+1.0394977E+01	+4.5000000E+02	+4.2000000E+02	+3.8886132E+02
104.0	10	+4.3029980E+02	+2.7596497E+01	+4.6200000E+02	+3.8800000E+02	+3.8810986E+02
116.0	5	+3.2305981E+02	+1.5111311E+01	+3.4600000E+02	+3.0400000E+02	+3.8735815E+02
140.0	5	+4.2479980E+02	+1.3682105E+01	+4.4400000E+02	+4.0800000E+02	+3.8648144E+02
143.0	7	+4.3486549E+02	+4.7433711E+01	+5.0900000E+02	+3.8279980E+02	+3.8566723E+02
152.0	3	+3.7214648E+02	+1.0870349E+00	+3.7329980E+02	+3.7123999E+02	+3.8510375E+02
230.0	6	+3.6613647E+02	+7.8439047E+00	+3.7302978E+02	+3.5789990E+02	+3.8021875E+02
248.0	5	+3.5139379E+02	+3.5397609E+00	+3.6400000E+02	+3.4150976E+02	+3.7902880E+02
254.0	5	+3.6634790E+02	+2.9591179E+00	+3.7019995E+02	+3.6195996E+02	+3.7846533E+02

UNIAXIAL TENSILE, STRESS AT RUP, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031134.

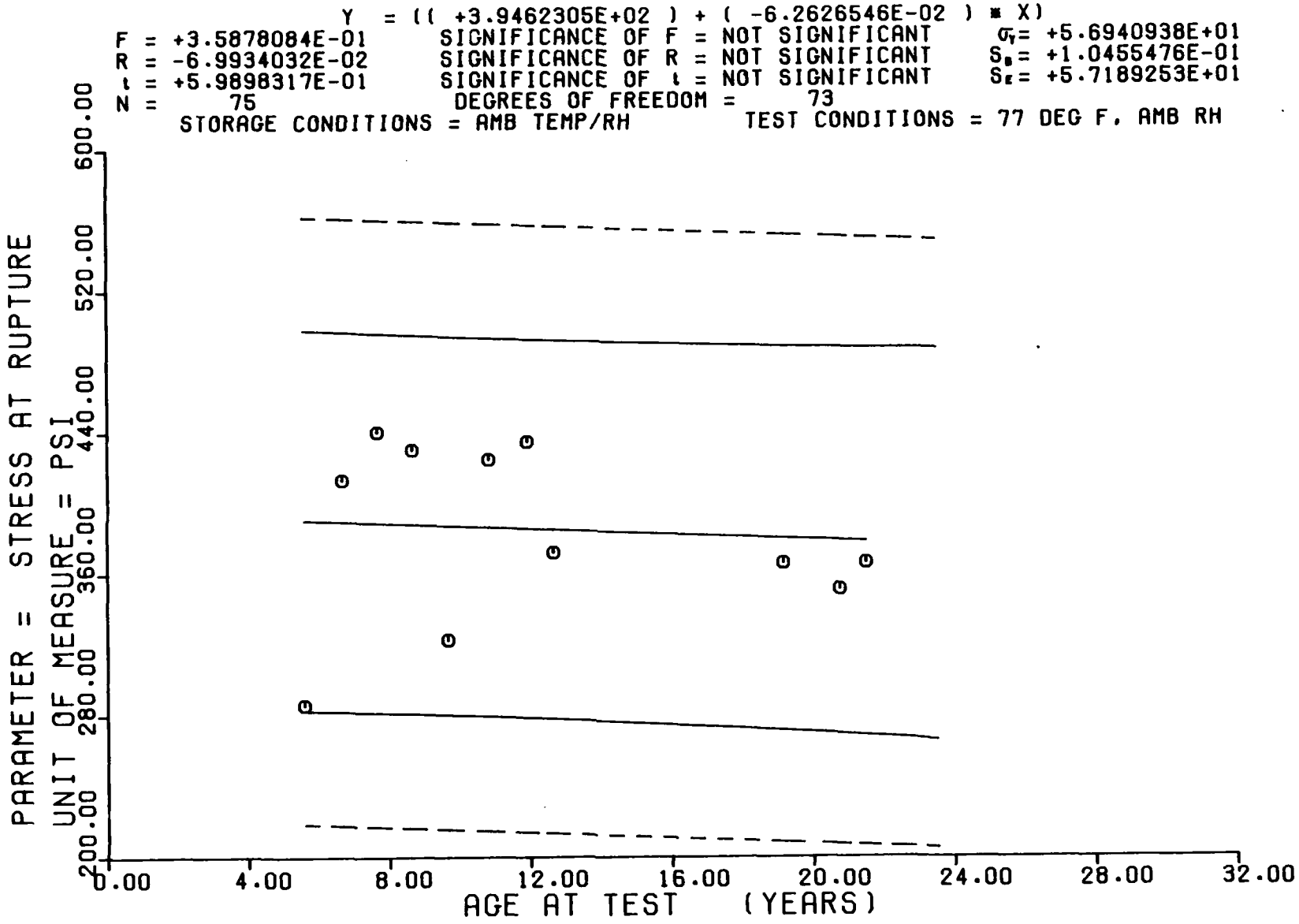

Y = ((+3.9462305E+02) + (-6.2626546E-02) * X)
F = +3.5878084E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT
R = -6.9934032E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT
t = +5.9898317E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT
N = 75 DEGREES OF FREEDOM = 73
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG F, AMB RH
PARAMETER = STRESS AT RUPTURE
UNIT OF MEASURE = PSI
600.00
520.00
440.00
360.00
280.00
200.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, STRESS AT RUP, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031134.

Figure 4-19

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
67.0	10	+5.0469958E-01	+1.8627096E-02	+5.2199995E-01	+4.5899999E-01	+5.0207930E-01
80.0	9	+5.0422191E-01	+1.3313103E-02	+5.2499997E-01	+4.7999995E-01	+5.0271344E-01
92.0	10	+4.9919962E-01	+9.6415934E-03	+5.1999998E-01	+4.8999994E-01	+5.0329881E-01
104.0	10	+4.7909963E-01	+1.4387741E-02	+5.0699996E-01	+4.5299994E-01	+5.0388425E-01
116.0	5	+5.2399957E-01	+7.6926053E-03	+5.3299999E-01	+5.1499998E-01	+5.0446963E-01
130.0	5	+5.3979969E-01	+9.3947854E-03	+5.4799997E-01	+5.2599996E-01	+5.0515258E-01
143.0	7	+5.0805664E-01	+1.6074084E-02	+5.2399998E-01	+4.8399996E-01	+5.0578677E-01
152.0	3	+5.1086616E-01	+6.8253874E-03	+5.1699995E-01	+5.0359994E-01	+5.0622582E-01
230.0	6	+4.9684953E-01	+1.4488414E-02	+5.1899999E-01	+4.8429995E-01	+5.1003080E-01
249.0	5	+5.2027946E-01	+6.8153711E-03	+5.2759999E-01	+5.1199996E-01	+5.1095771E-01
258.0	5	+5.0755977E-01	+1.2365844E-02	+5.2339994E-01	+4.8999994E-01	+5.1139676E-01

UNIAXIAL TENSILE, STRAIN AT RUP, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031134.

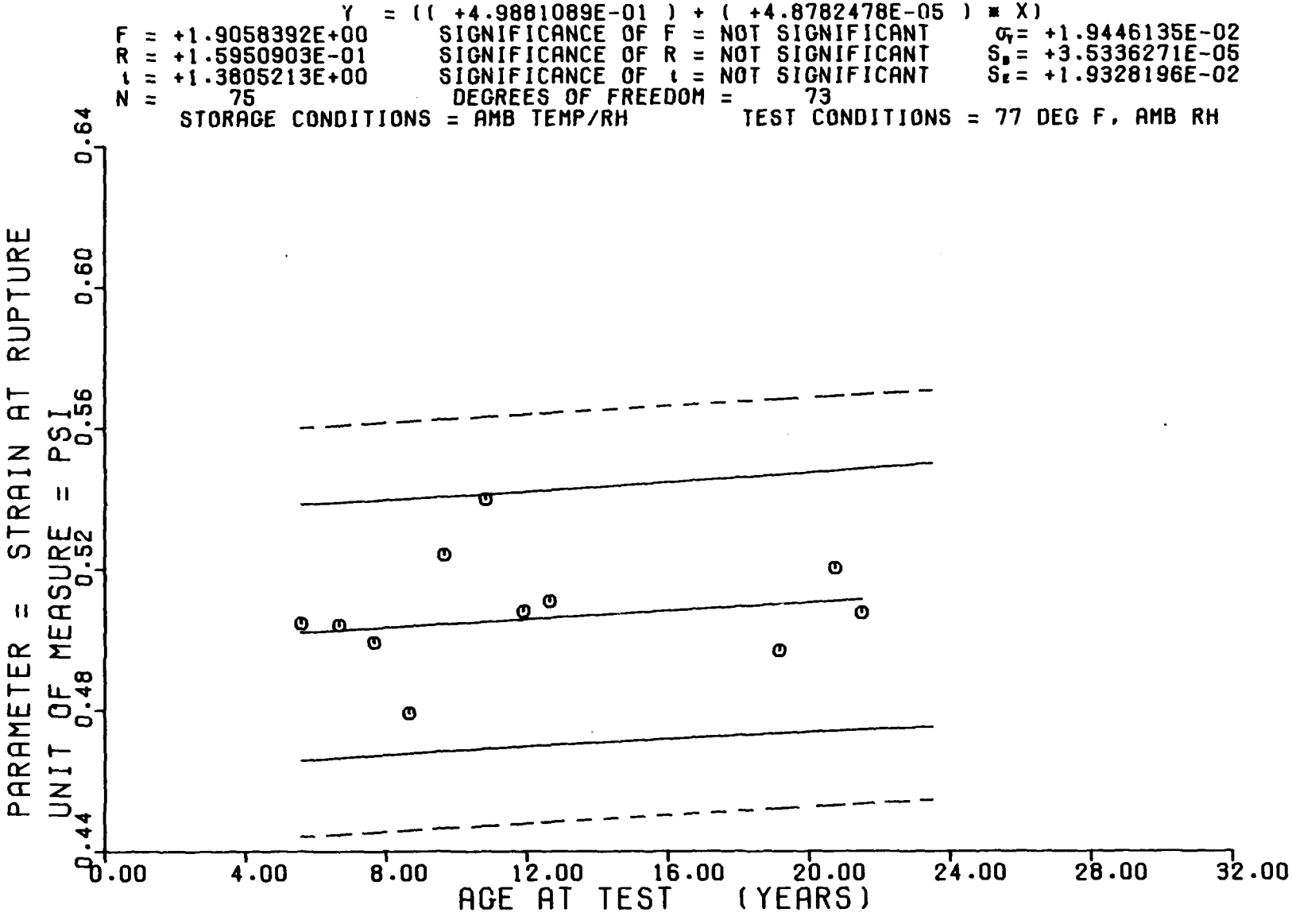

Y = ((+4.9881089E-01) + (+4.8782478E-05) * X)
F = +1.9058392E+00 SIGNIFICANCE OF F = NOT SIGNIFICANT σY= +1.9446135E-02
R = +1.5950903E-01 SIGNIFICANCE OF R = NOT SIGNIFICANT Sb= +3.5336271E-05
t = +1.3805213E+00 SIGNIFICANCE OF t = NOT SIGNIFICANT Se= +1.9328196E-02
N = 75 DEGREES OF FREEDOM = 73
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG F, AMB RH
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = PSI
0.64
0.60
0.56
0.52
0.48
0.44
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, STRAIN AT RUP, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031134.

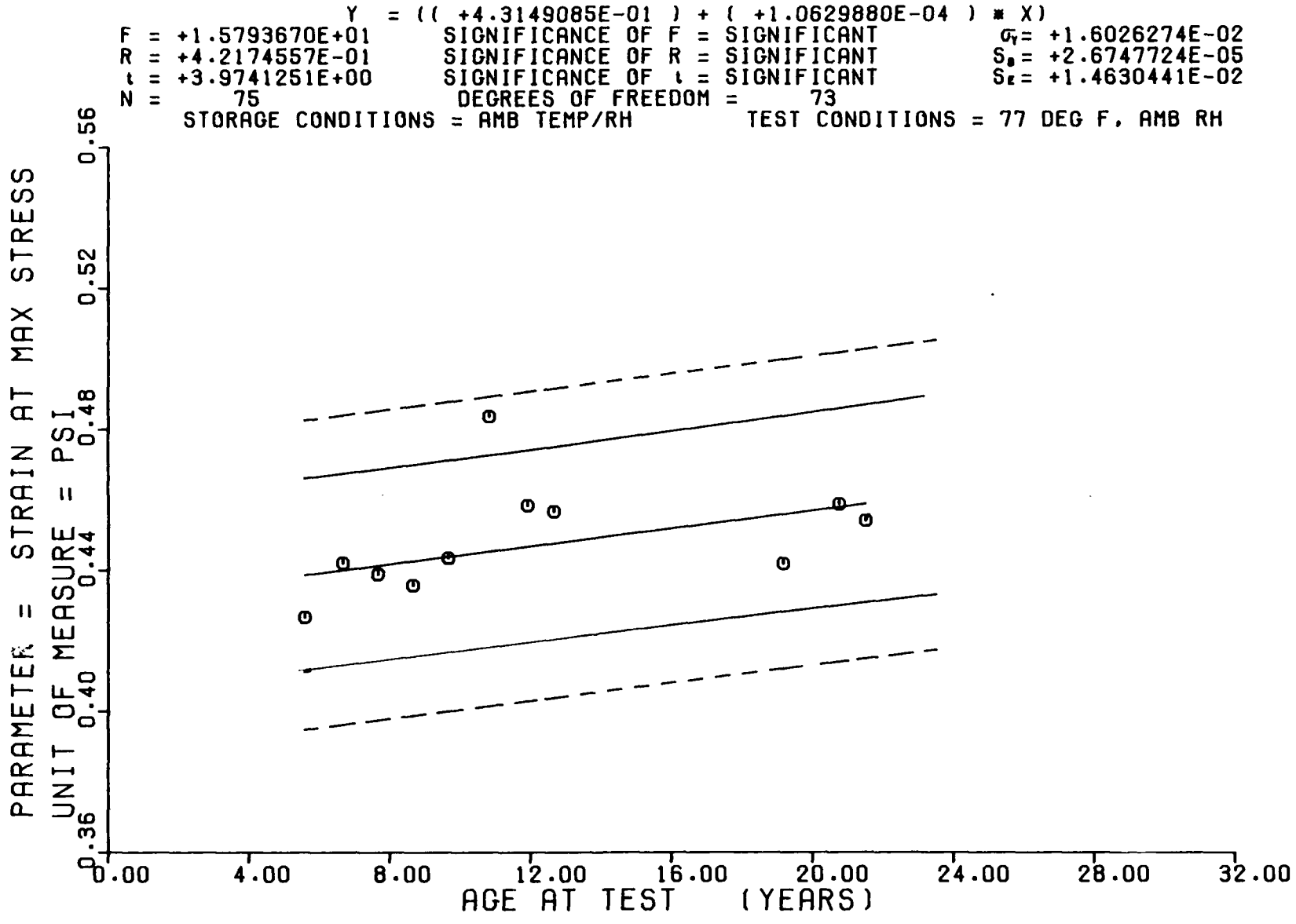
Figure 4-18

****** LINEAR REGRESSION ANALYSIS ******

***** ANALYSIS OF TIME SERIES *****

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
67.0	10	+4.2669951E-01	+6.5385333E-03	+4.3499994E-01	+4.1199994E-01	+4.3861281E-01
80.0	9	+4.4199961E-01	+3.8898424E-03	+4.4499999E-01	+4.3499994E-01	+4.3999475E-01
92.0	10	+4.3879956E-01	+9.4774412E-03	+4.5199996E-01	+4.1999995E-01	+4.4127029E-01
104.0	10	+4.3569952E-01	+1.1444890E-02	+4.6099996E-01	+4.1999995E-01	+4.4254589E-01
116.0	5	+4.4339978E-01	+1.5780289E-03	+4.4499999E-01	+4.4199997E-01	+4.4382148E-01
130.0	5	+4.8359966E-01	+2.2278151E-03	+4.8599994E-01	+4.7999995E-01	+4.4530969E-01
143.0	7	+4.5838546E-01	+1.2331770E-02	+4.7029995E-01	+4.3599998E-01	+4.4669157E-01
152.0	3	+4.5073304E-01	+4.2207913E-03	+4.6149998E-01	+4.5369994E-01	+4.4764822E-01
230.0	6	+4.4186639E-01	+1.4435750E-03	+4.4299995E-01	+4.3989998E-01	+4.5593953E-01
249.0	5	+4.5883959E-01	+3.0737838E-03	+4.6309995E-01	+4.5529997E-01	+4.5795923E-01
258.0	5	+4.5407980E-01	+8.4506896E-03	+4.5969998E-01	+4.3939995E-01	+4.5891588E-01

UNIAXIAL TENSILE, STRAIN AT MAX, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031134.



UNIAXIAL TENSILE, STRAIN AT MAX, 2.0 IN/MIN AT 77 DEG F, MOTOR=0031134.

Figure 4-17

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
55.0	10	+3.6519995E+02	+7.4206917E+00	+3.7800000E+02	+3.5300000E+02	+4.1057177E+02
68.0	9	+4.1766650E+02	+4.3588989E+00	+4.2500000E+02	+4.1200000E+02	+4.0600732E+02
80.0	10	+4.2600000E+02	+5.6764621E+00	+4.3500000E+02	+4.1500000E+02	+4.0179370E+02
92.0	9	+4.1011108E+02	+9.6234666E+00	+4.2600000E+02	+4.0000000E+02	+3.9758007E+02
105.0	5	+3.5493994E+02	+7.6270894E+00	+3.6769995E+02	+3.4859985E+02	+3.9301562E+02
118.0	5	+4.2479980E+02	+1.6828547E+01	+4.4400000E+02	+4.0000000E+02	+3.8845092E+02
132.0	7	+4.0461132E+02	+7.6758767E+00	+4.1407983E+02	+3.9369995E+02	+3.8353515E+02
140.0	3	+3.6965991E+02	+5.6246394E+00	+3.7547998E+02	+3.6425976E+02	+3.8072607E+02
219.0	6	+3.7386474E+02	+5.1658409E+00	+3.7870996E+02	+3.6489990E+02	+3.5298730E+02
237.0	5	+2.8734179E+02	+2.5263873E+01	+3.3164990E+02	+2.7060986E+02	+3.4666699E+02
246.0	5	+3.5542773E+02	+4.6699180E+00	+3.6206982E+02	+3.5150000E+02	+3.4350683E+02

UNIAXIAL TENSILE, MAXIMUM STRESS, 2.0 IN/MIN AT 77 DEG F, MOTOR=0032434.

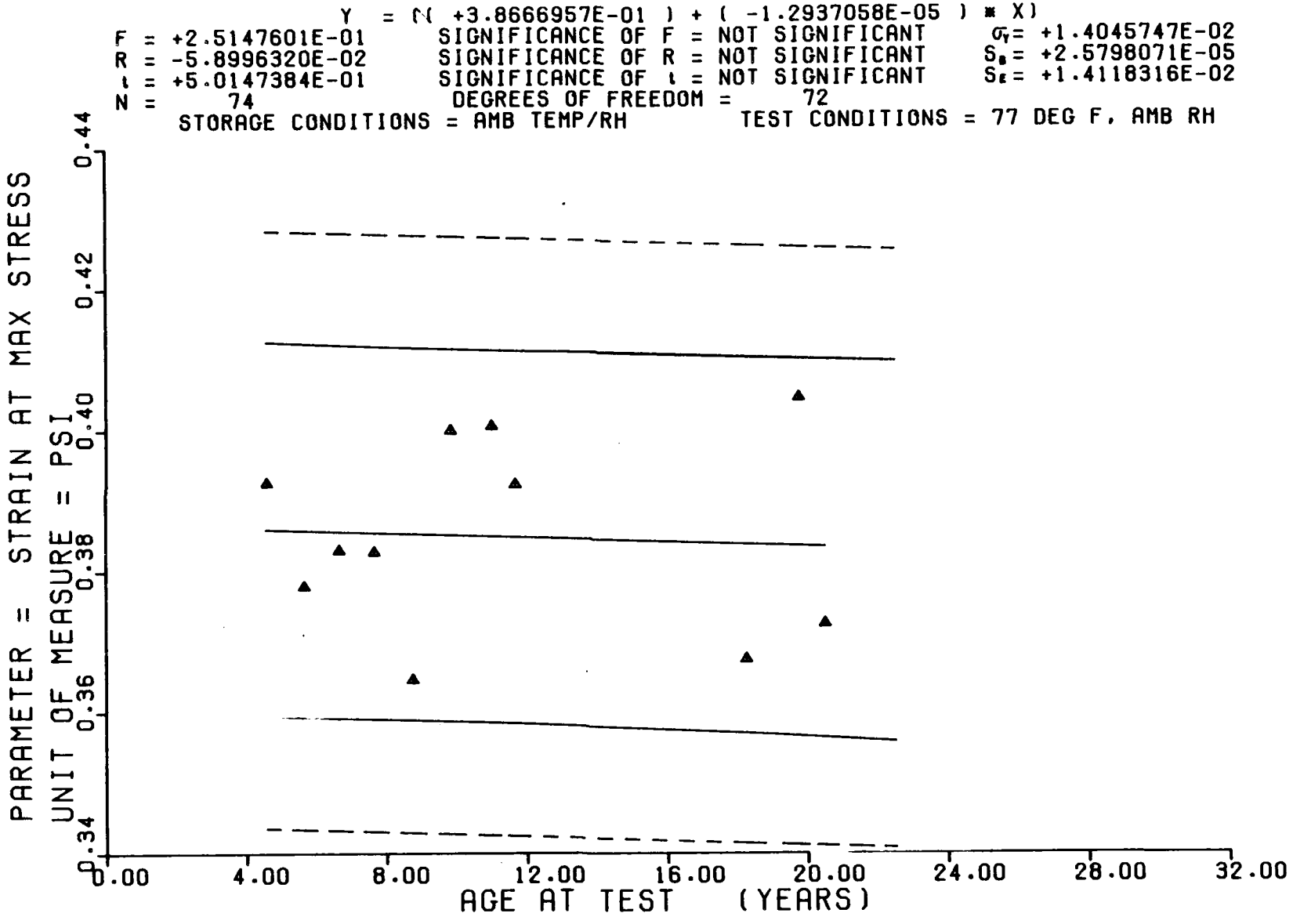

Y = (+3.8666957E-01) + (-1.2937058E-05) * X)
F = +2.5147601E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT σr= +1.4045747E-02
R = -5.8996320E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT Sa= +2.5798071E-05
t = +5.0147384E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT Sε= +1.4118316E-02
N = 74 DEGREES OF FREEDOM = 72
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG F, AMB RH
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = PSI
0.44
0.42
0.40
0.38
0.36
0.34
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, STRAIN AT MAX, 2.0 IN/MIN AT 77 DEG F, MOTOR=0032434.

Figure 4-27

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
55.0	10	+3.9259964E-01	+9.2447333E-03	+4.1199994E-01	+3.8199996E-01	+3.8595801E-01
68.0	9	+3.7788856E-01	+6.3218515E-03	+3.8599997E-01	+3.6799997E-01	+3.8578981E-01
80.0	10	+3.8299947E-01	+5.9690495E-03	+3.9499998E-01	+3.7500000E-01	+3.8563460E-01
92.0	9	+3.8277751E-01	+1.0257653E-02	+3.9799994E-01	+3.6299997E-01	+3.8547933E-01
105.0	5	+3.6459976E-01	+3.5242881E-03	+3.6999994E-01	+3.6099994E-01	+3.8531118E-01
118.0	5	+3.9999979E-01	+1.2089275E-02	+4.1199994E-01	+3.7999999E-01	+3.8514298E-01
132.0	7	+4.0061390E-01	+9.1882850E-03	+4.0899997E-01	+3.8249999E-01	+3.8496184E-01
140.0	3	+3.9236640E-01	+9.0313813E-04	+3.9279997E-01	+3.9149999E-01	+3.8485836E-01
219.0	6	+3.6753284E-01	+3.0124252E-03	+3.7199997E-01	+3.6409997E-01	+3.8383632E-01
237.0	5	+4.0459972E-01	+7.8216063E-03	+4.0989995E-01	+3.9089995E-01	+3.8360345E-01
246.0	5	+3.7255972E-01	+1.7066662E-03	+3.7409996E-01	+3.7019997E-01	+3.8348704E-01

UNIAXIAL TENSILE, STRAIN AT MAX, 2.0 IN/MIN AT 77 DEG F, MOTOR=0032434.

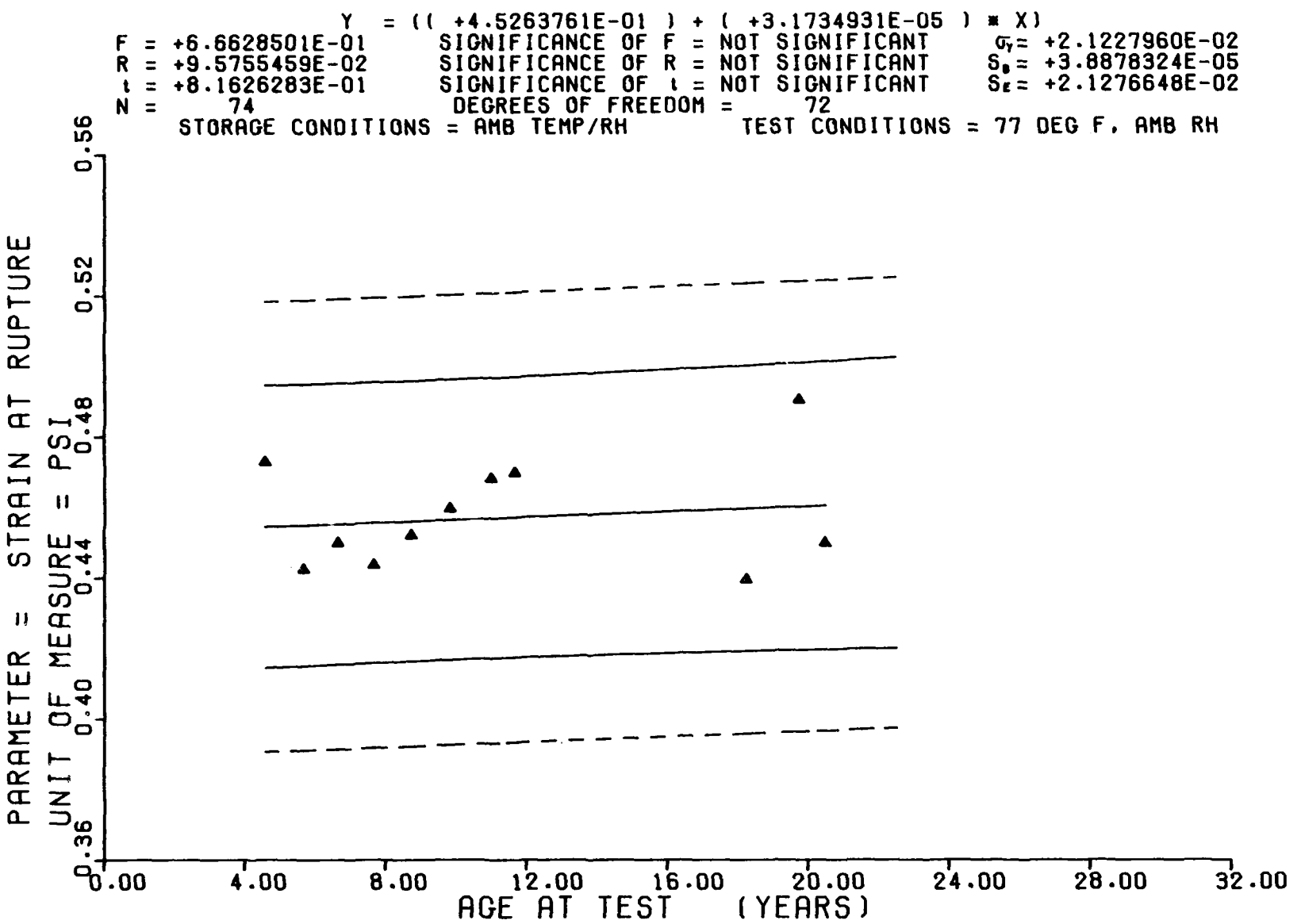

Y = ((+4.5263761E-01) + (+3.1734931E-05) * X)
F = +6.6628501E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT σY= +2.1227960E-02
R = +9.5755459E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT Sβ= +3.8878324E-05
t = +8.1626283E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT Sε= +2.1276648E-02
N = 74 DEGREES OF FREEDOM = 72
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG F, AMB RH
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = PSI
0.56
0.52
0.48
0.44
0.40
0.36
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, STRAIN AT RUP, 2.0 IN/MIN AT 77 DEG F, MOTOR=0032434.

Figure 4-28

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
55.0	10	+4.7279953E-01	+1.0355348E-02	+4.8299998E-01	+4.5099997E-01	+4.5438301E-01
68.0	9	+4.4233310E-01	+2.3943043E-02	+4.5499998E-01	+3.7999999E-01	+4.5479553E-01
80.0	10	+4.4979971E-01	+8.8202296E-03	+4.6499997E-01	+4.3499994E-01	+4.5517641E-01
92.0	9	+4.4355517E-01	+1.7345953E-02	+4.8199999E-01	+4.2299997E-01	+4.5555722E-01
105.0	5	+4.5199960E-01	+1.0942681E-02	+4.6599996E-01	+4.3599998E-01	+4.5596975E-01
118.0	5	+4.5959967E-01	+2.6514381E-02	+4.7999995E-01	+4.1399997E-01	+4.5638233E-01
132.0	7	+4.6807098E-01	+2.1198064E-02	+4.9199998E-01	+4.4549995E-01	+4.5682662E-01
140.0	3	+4.6969985E-01	+5.2236655E-03	+4.7439998E-01	+4.6409994E-01	+4.5708048E-01
219.0	6	+4.3948298E-01	+9.4050625E-03	+4.5309996E-01	+4.2699998E-01	+4.5958751E-01
237.0	5	+4.9031943E-01	+2.1911117E-02	+5.0709998E-01	+4.5309996E-01	+4.6015876E-01
246.0	5	+4.4979971E-01	+5.7274727E-03	+4.5969998E-01	+4.4489997E-01	+4.6044439E-01

UNIAXIAL TENSILE, STRAIN AT RUP, 2.0 IN/MIN AT 77 DEG F, MOTOR=0032434.

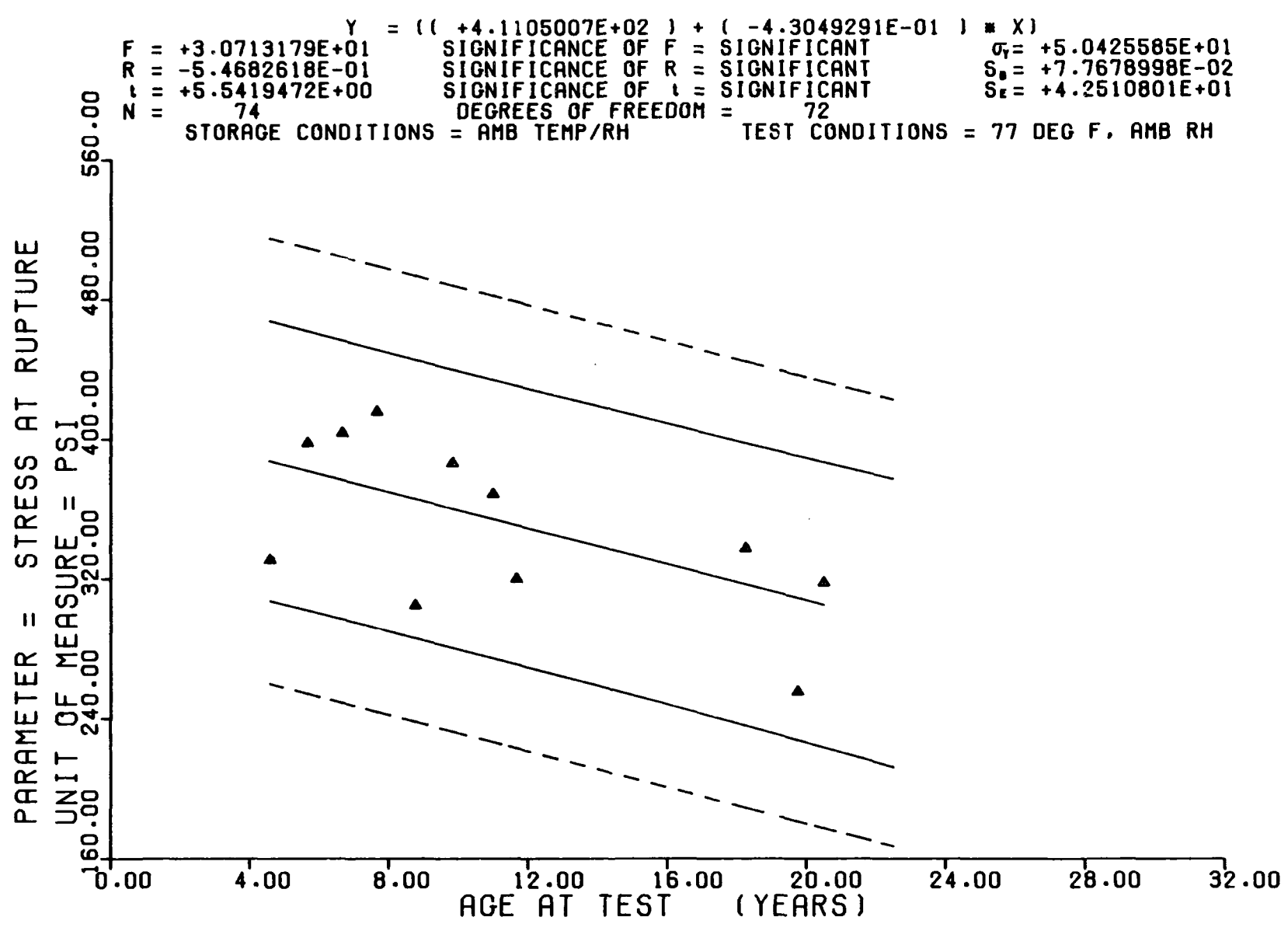

Y = ((+4.1105007E+02) + (-4.3049291E-01) * X)
F = +3.0713179E+01 SIGNIFICANCE OF F = SIGNIFICANT
R = -5.4682618E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +5.5419472E+00 SIGNIFICANCE OF t = SIGNIFICANT
N = 74 DEGREES OF FREEDOM = 72
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG F, AMB RH
σT= +5.0425585E+01
SB= +7.7678998E-02
SE= +4.2510801E+01
PARAMETER = STRESS AT RUPTURE
UNIT OF MEASURE = PSI
160.00
240.00
320.00
400.00
480.00
560.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
UNIAXIAL TENSILE, STRESS AT RUP, 2.0 IN/MIN AT 77 DEG F, MOTOR=0032434.

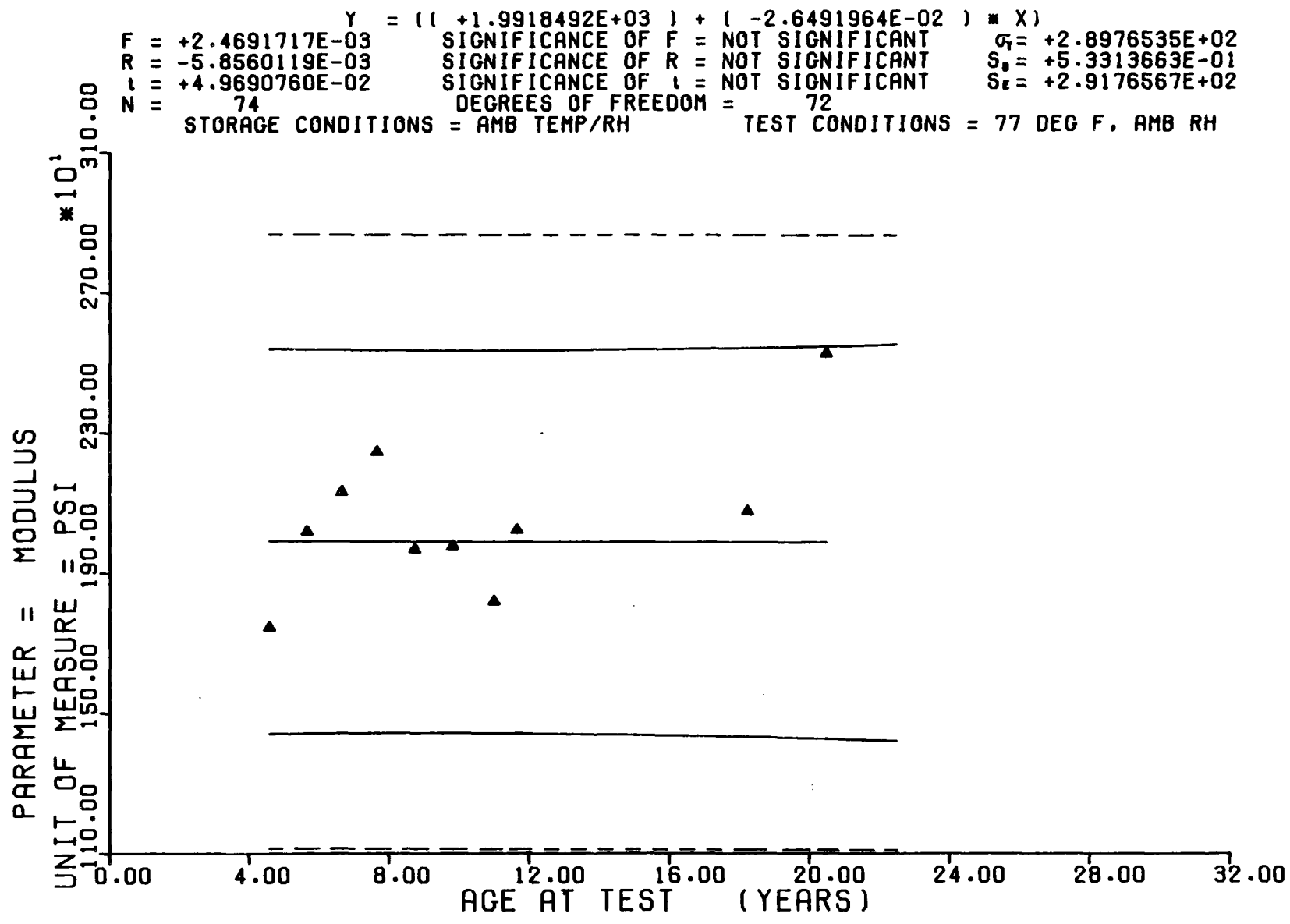
Figure 4-29

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (HUNTED)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
55.0	10	+3.3079980E+02	+1.2025897E+01	+3.4200000E+02	+3.1900000E+02	+3.8737280E+02
68.0	9	+3.9766650E+02	+7.8421935E+00	+4.1000000E+02	+3.8500000E+02	+3.8177636E+02
80.0	10	+4.0350000E+02	+1.4550317E+01	+4.2000000E+02	+3.8000000E+02	+3.7661059E+02
92.0	9	+4.1577756E+02	+4.1321234E+01	+4.3900000E+02	+3.7800000E+02	+3.7144458E+02
105.0	5	+3.0491992E+02	+1.6209529E+01	+3.2400000E+02	+2.8700000E+02	+3.6584814E+02
118.0	5	+3.3639990E+02	+1.3445169E+01	+4.0800000E+02	+3.7200000E+02	+3.6025170E+02
132.0	7	+3.6873415E+02	+2.3699068E+01	+3.9200000E+02	+3.3700000E+02	+3.5422485E+02
146.0	3	+3.2003320E+02	+1.4503175E+01	+3.3507983E+02	+3.0614990E+02	+3.5078100E+02
219.0	6	+3.5743310E+02	+1.0050763E+01	+3.4821997E+02	+3.2377978E+02	+3.1677197E+02
257.0	5	+2.5543193E+02	+3.0092872E+01	+3.0797998E+02	+2.3602999E+02	+3.0902319E+02
296.0	5	+3.1782788E+02	+5.1864740E+00	+3.2650000E+02	+3.1362988E+02	+3.0514868E+02

UNIAXIAL TENSILE, STRESS AT RUP, 2.0 IN/MIN AT 77 DEG F, MUTOR=0032434.



UNIAXIAL TENSILE, MODULUS, 2.0 IN/MIN AT 77 DEG F, MOTOR=0032434.

Figure 4-39

**** LINEAR REGRESSION ANALYSIS ****

*** ANALYSIS OF TIME SERIES ***

AGE (MONTHS)	SPECIMENS PER GROUP	MEAN Y	STANDARD DEVIATION	MAXIMUM Y	MINIMUM Y	REGRESSION Y
55.0	10	+1.7457998E+03	+1.0883606E+02	+1.9130000E+03	+1.6120000E+03	+1.9903920E+03
68.0	9	+2.0177775E+03	+9.5751994E+01	+2.2200000E+03	+1.9000000E+03	+1.9900476E+03
80.0	10	+2.1310000E+03	+5.8581377E+01	+2.2000000E+03	+2.0400000E+03	+1.9897297E+03
92.0	9	+2.2450000E+03	+7.5920188E+01	+2.3500000E+03	+2.1550000E+03	+1.9894118E+03
105.0	5	+1.9663999E+03	+3.4129166E+01	+2.0000000E+03	+1.9200000E+03	+1.9890673E+03
118.0	5	+1.9760000E+03	+8.7338422E+01	+2.1100000E+03	+1.9100000E+03	+1.9887231E+03
132.0	7	+1.8184284E+03	+9.6931861E+01	+1.9460000E+03	+1.7130000E+03	+1.9883522E+03
140.0	3	+2.0216665E+03	+2.6274195E+01	+2.0420000E+03	+1.9920000E+03	+1.9881401E+03
219.0	6	+2.0746665E+03	+7.6217233E+01	+2.2190000E+03	+1.9980000E+03	+1.9860473E+03
237.0	5	+1.2900000E+03	+1.8377567E+02	+1.5980000E+03	+1.1140000E+03	+1.9855705E+03
246.0	5	+2.5243999E+03	+1.5353110E+02	+2.7300000E+03	+2.3880000E+03	+1.9853320E+03

UNIAXIAL TENSILE, MODULUS, 2.0 IN/MIN AT 77 DEG F, MOTOR=0032434.

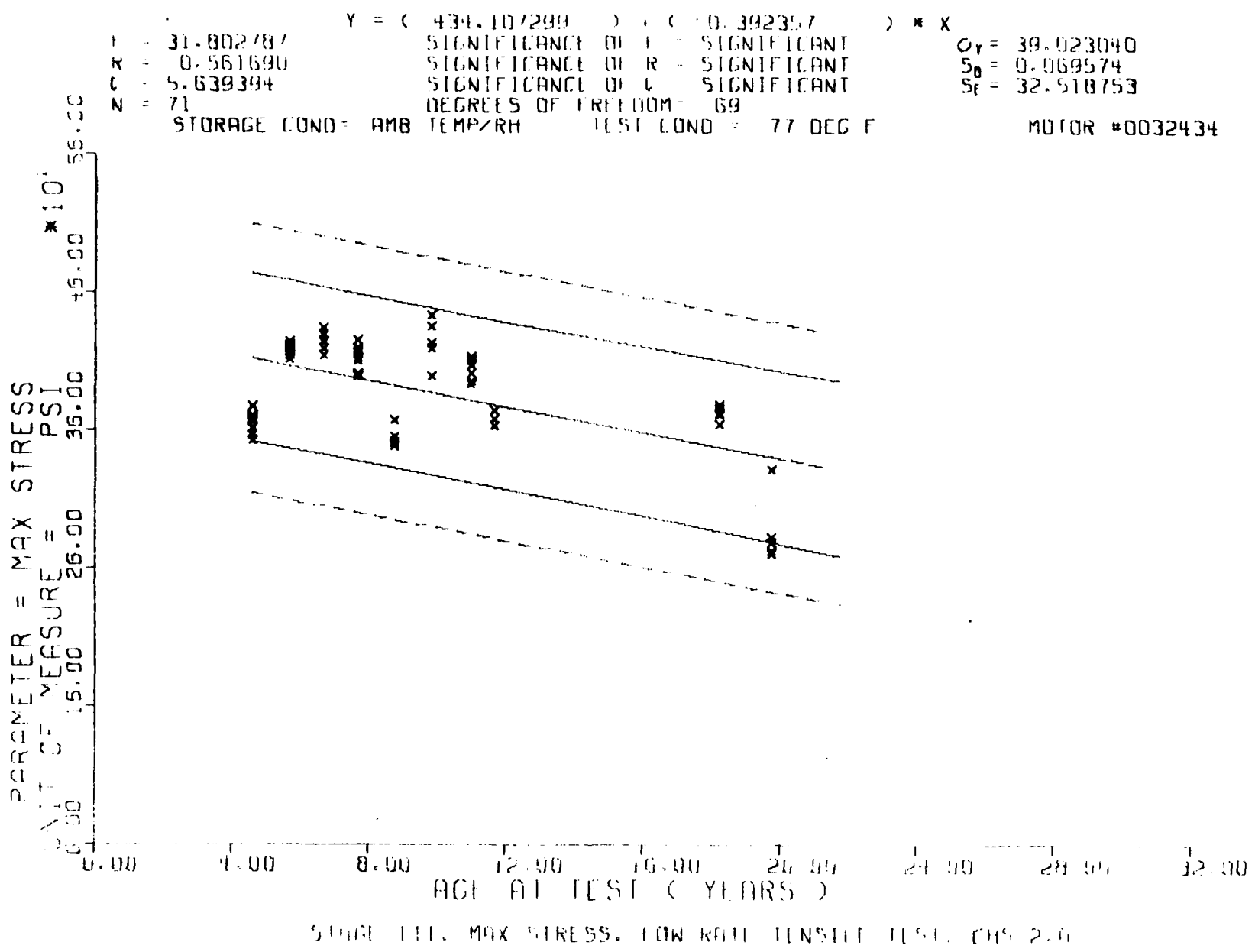

Y = (434.107299) + (-0.392357) * X
F = 31.802787
R = 0.561690
C = 5.639394
N = 71
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF C = SIGNIFICANT
DEGREES OF FREEDOM = 69
σ_Y = 39.023040
S_D = 0.069574
S_E = 32.518753
STORAGE COND = AMB TEMP/RH
TEST COND = 77 DEG F
MOTOR #0032434
PARAMETER = MAX STRESS PSI
UNIT OF MEASURE = *10
55.00
45.00
35.00
25.00
15.00
5.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
STAGE III. MAX STRESS, LOW RATE TENSILE TEST, CMS 2.6

Figure 4-31

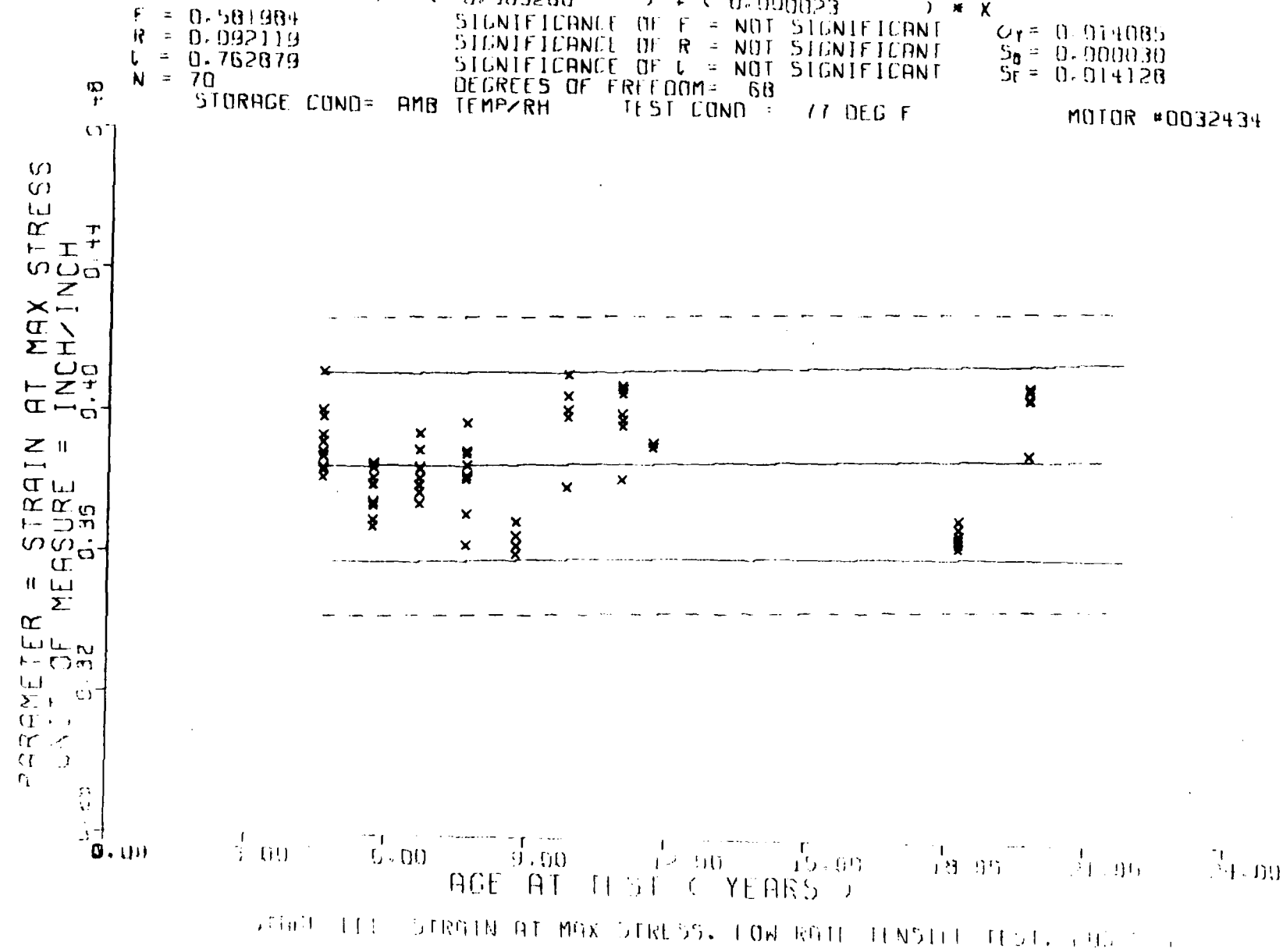

Y = (0.383260) + (0.000023) * X
F = 0.581984
R = 0.092119
L = 0.762879
N = 70
SIGNIFICANCE OF F = NOT SIGNIFICANT
SIGNIFICANCE OF R = NOT SIGNIFICANT
SIGNIFICANCE OF L = NOT SIGNIFICANT
DEGREES OF FREEDOM= 68
σ_Y = 0.014085
S_B = 0.000030
S_E = 0.014128
STORAGE COND= AMB TEMP/RH
TEST COND = 77 DEG F
MOTOR #0032434
PARAMETER = STRAIN AT MAX STRESS
0.40
0.35
0.32
0.44
0.00
5.00
AGE AT TEST (YEARS)
STRAIN AT MAX STRESS, LOW RATE TENSILE TEST,

Figure 4-32

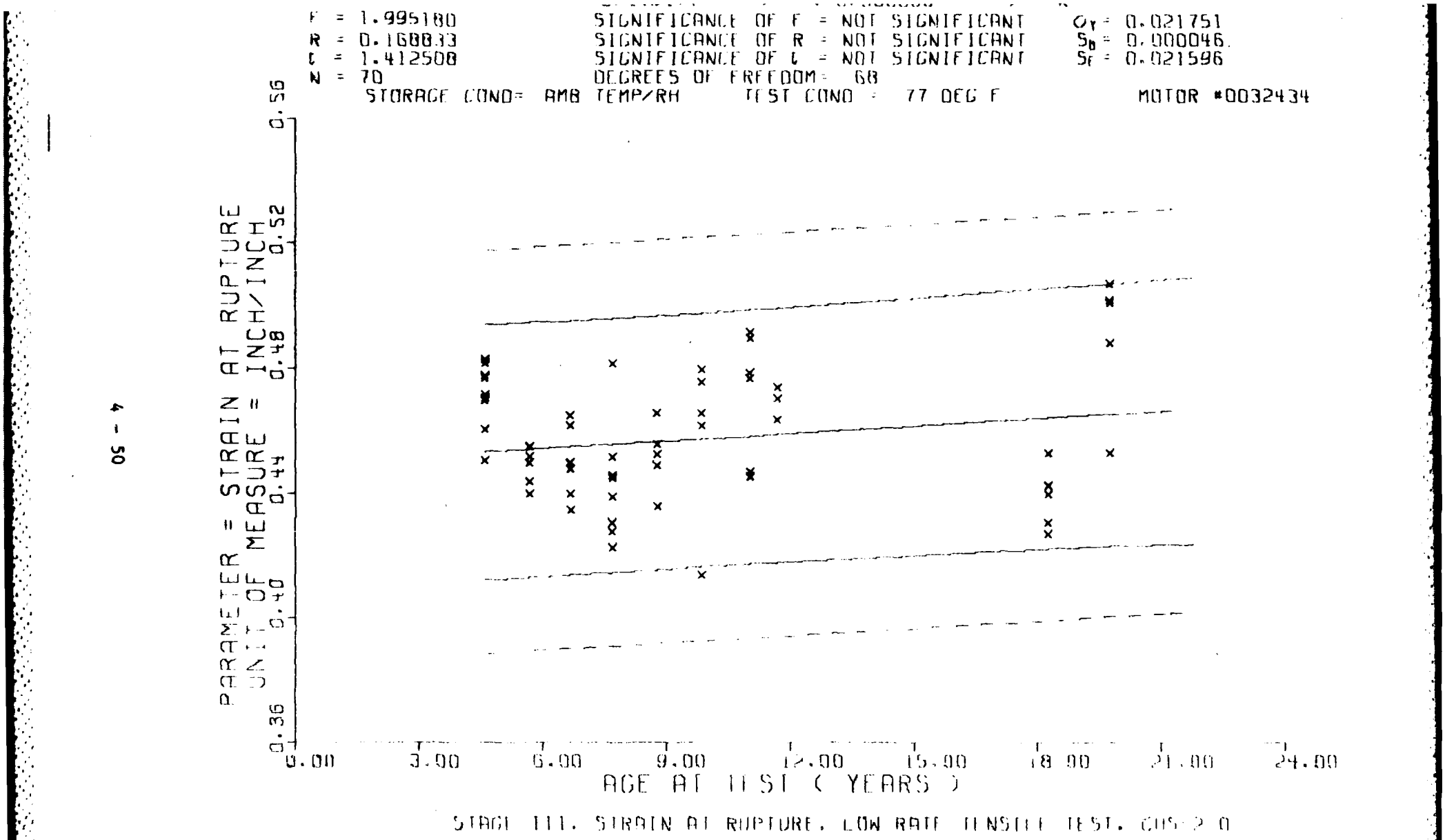

F = 1.995180
R = 0.168833
t = 1.412508
N = 70
SIGNIFICANCE OF F = NOT SIGNIFICANT
SIGNIFICANCE OF R = NOT SIGNIFICANT
SIGNIFICANCE OF t = NOT SIGNIFICANT
DEGREES OF FREEDOM = 68
σ_Y = 0.021751
S_b = 0.000046
S_F = 0.021596
STORAGE COND= AMB TEMP/RH
TEST COND = 77 DEG F
MOTOR #0032434
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = INCH/INCH
0.56
0.52
0.48
0.44
0.40
0.36
0.00
3.00
6.00
9.00
12.00
15.00
18.00
21.00
24.00
AGE AT TEST (YEARS)
STAGE III, STRAIN AT RUPTURE, LOW RATE TENSILE TEST, CUS 2 0

Figure 4-33

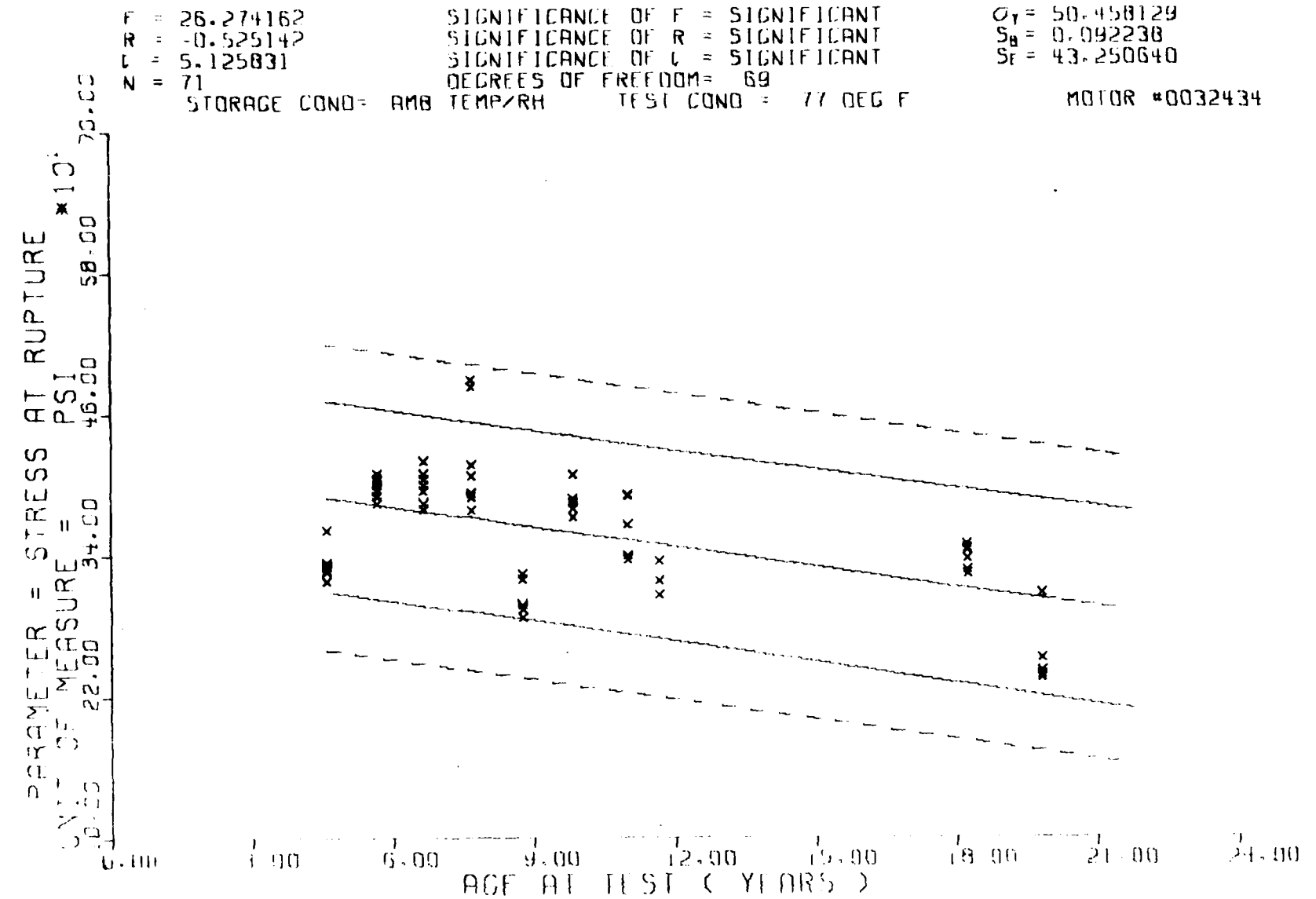

F = 26.274162
R = -0.525142
L = 5.125831
N = 71
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF L = SIGNIFICANT
DEGREES OF FREEDOM= 69
σ_Y = 50.458129
S_B = 0.092238
S_E = 43.250640
STORAGE COND= AMB TEMP/RH
TEST COND = 77 DEG F
MOTOR #0032434
PARAMETER = STRESS AT RUPTURE *10
TYPE OF MEASURE = PSI
58.00
46.00
34.00
22.00
6.00
9.00
12.00
15.00
18.00
21.00
24.00
AGE AT TEST (YEARS)
STAGE III. STRESS AT RUPTURE, LOW RATE TENSILE TEST, CHS 2.0

Figure 4-34

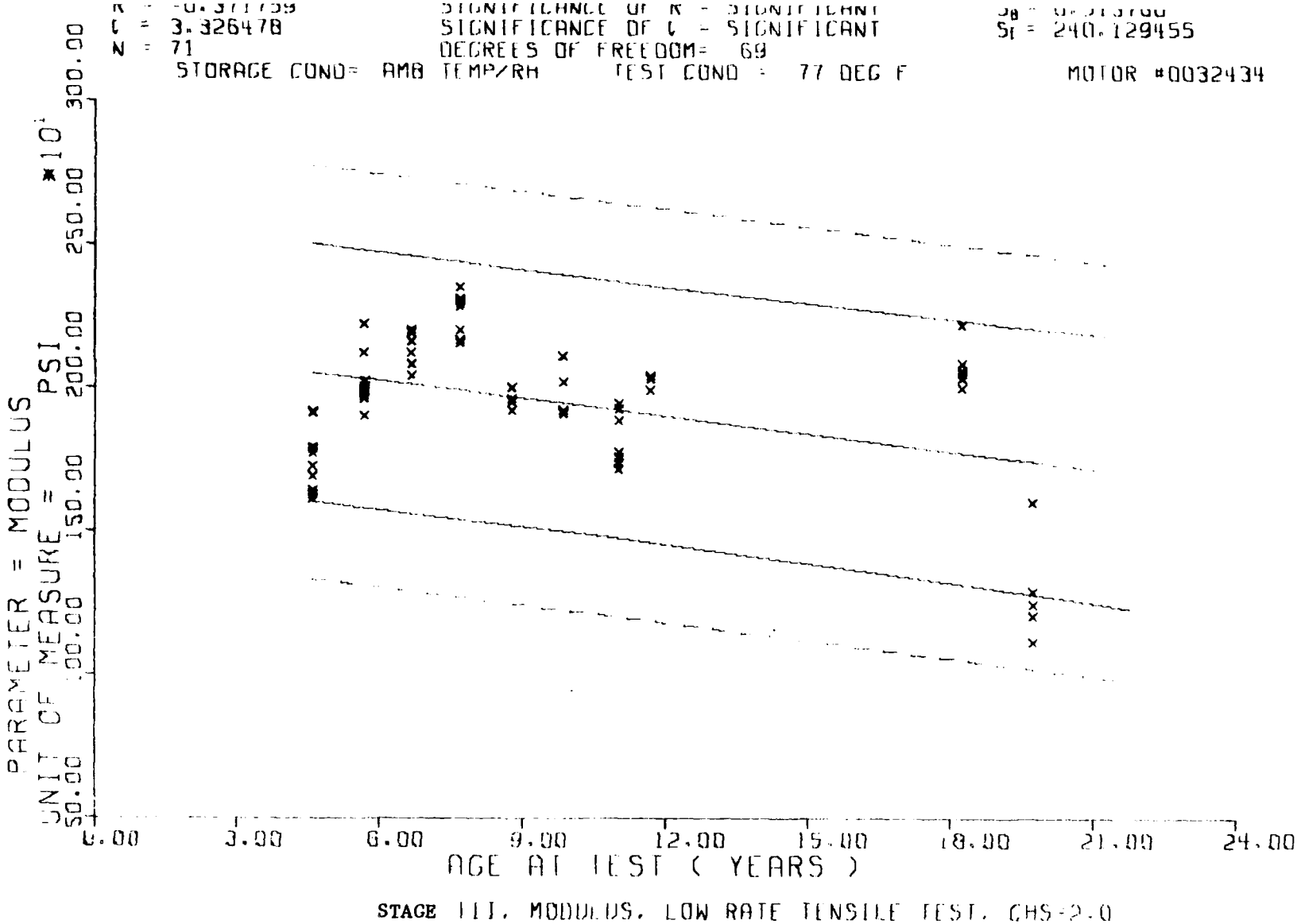

C = 3.326478
N = 71
SIGNIFICANCE OF C = SIGNIFICANT
DEGREES OF FREEDOM= 69
Sf = 240.129455
STORAGE COND= AMB TEMP/RH
TEST COND = 77 DEG F
MOTOR #0032434
PARAMETER = MODULUS
UNIT OF MEASURE = PSI
*10³
300.00
250.00
200.00
150.00
100.00
50.00
0.00
3.00
6.00
9.00
12.00
15.00
18.00
21.00
24.00
AGE AT TEST (YEARS)
STAGE III, MODULUS, LOW RATE TENSILE TEST, CHS-2.0

Figure 4-35